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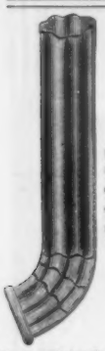

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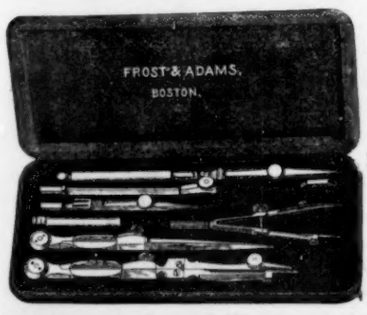

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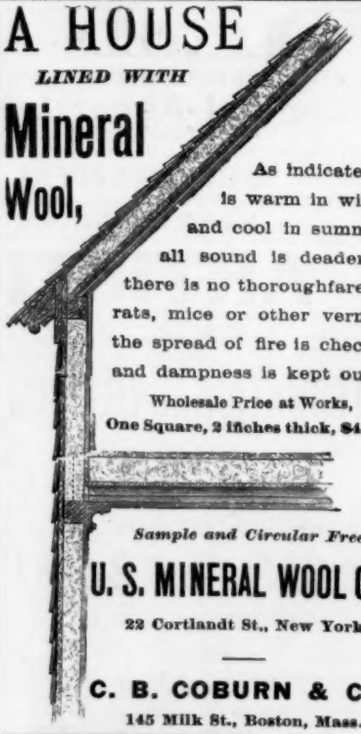

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Friezes, Panels, Mantel-Facings, Bas-Reliefs, &c., from Original Designs or those furnished, for the interior Decoration of Dwelling-Houses, Public Buildings, Hotels, Elevator-Cabs, Parlor and Passenger Cars, Steamers, &c., in Copper, Brass, Bronze, and Silver, reproducing with exact fidelity natural objects or other models.
Special attention is called to the reproductions from natural leaves and flowers in the panels and tiles for furniture and interiors.
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Artists Materials Generally.
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Hand-Hoists operated with ropes or cranks. Automatic Hatch-doors. Governors, and Safety-catches.
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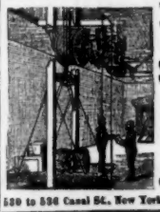
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ESPECIALLY ADAPTED TO
Public Buildings, Private Residences, Mills, Warehouses, Stores, and all Mercantile Structures.
IT IS POSITIVELY FIRE-PROOF.
WIRE LATHING possesses the following qualities:
IT IS NOT COSTLY.
IT IS EASILY AND CHEAPLY APPLIED.
PLASTERING ON THE WIRE LATH WILL NOT CRACK.
THE LATH WILL NOT CORRODE.
The plastering, when applied, clinches on both sides of the wire, forming a double surface.
THE WIRE LATHING is extensively used by the United States Government in its Custom House Court House, and Post Office Buildings.
It is indorsed by the leading Insurance Companies, who have applied it to their own fine edifices.
Full information given on application to the
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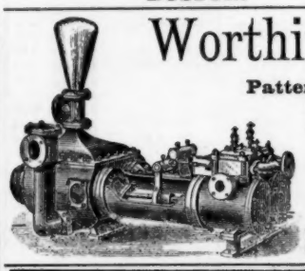
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Patterns specially adapted to
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HANOVER FIRE INSURANCE CO.

Cash Capital	$1,000,000.00
Reserve for Re-insurance	635,741.16
Reserve for all other Liabilities,	96,655.57
Net Surplus	832,744.56
Total Assets, January 1, 1883	2,565,141.29

BUILDING MATERIALS.
Reported for the American Architect and Building News.

BRICK.—₱ M.	New York. (Wholesale Prices.)	Boston. (Prices to Builders and Contractors.)	Chicago. (Prices to Builders and Contractors.)	Philadelphia. (Prices to Builders and Contractors.)
Common: *Cargo afloat.*				
Pale	$2 50 @ $3 50	Eastern	Building Brick	Hard
Jersey	4 50 @ 5 25	7 50 @ 8 00	6 50 @ 7 50	8 00 @ 8 50
		Bay State Hard		Salmon
Up River	5 00 @ 5 50	9 00		5 00 @ 6 00
Haverstraw Bay	5 50 @ 6 00	Domestic Com.	Indiana Pressed	Stretchers
" 1st	6 00 @ 6 50	8 00 @ 9 00	16 00 @ 28 00	11 00 @ 14 00
		Domestic Face	St. Louis Fronts	Pressed
Fronts:		19 00 @ 20 00	25 00 @ 30 00	20 00 @ 24 00
Croton, Brown	13 @ 14 00	Philadelphia		
" dark	14 @ 15 00	40 00 @ 45 00		
" red	14 @ 15 00	Phila. mould		
Chicago pressed		50 00 @ 80 00	22 00 @ 35 00	
Chicago Moulded			65 00 @ 350 00	
Baltimore	37 @ 41 00		50 00 @	
Glens Falls—white	30 @ 35 00	Glens Falls		
Philadelphia	@ 27 00	25 00 @ 26 00	42 00 @	
Trenton	@ 27 00		40 00 @	
Milwaukee		Glens Falls	25 00 @	
Moulded:		Mould.	60 00 @ 100 00	
Clark's Glens Falls—Red	25 00 @ 27 00	30 00 @ 35 00	30 @	
" —White	30 00 @ 35 00	35 00 @ 40 00	35 @	
White " Mold	45 00 @ 60 00	45 00 @ 60 00	55 00 @ 65 00	
Enamelled: *Imp.*				
Enamelled (edge.)	85 00 @ 100 00	@	@ 100 00	Dom. @ 70
Enamelled (edge and end)	90 00 @ 115 00	@	@ 125 00	@ 85
CEMENT, LIME, etc.—(₱ *cask.*)				
Chicago Lime in bulk			65 @ 75	
Wisconsin "			80 @ 90	
Rosendale Cement	80 @ 1 00	@ 1 50	*Not Sold.*	1 25 @ 1 65
Utica, Akron, Buffalo, Louisville, Milwaukee	*Not sold.*	*Not sold.*	1 00 @ 1 25	*Not sold.*
Portland (English)	2 60 @ 3 10	@ 3 20	2 75 @ 3 00	2 90 @ 3 50
" (Saylor's Am.)	2 05 @ 2 40	2 50 @ 3 00	2 75 @ 3 00	2 50 @ 3 00
" (Dyckerhoff)	2 75 @ 3 15	3 00 @ 3 50	3 25 @ 3 75	3 00 @ 3 25
" (Lafarge)	3 50 @ 3 75	*Not sold.*	3 75 @ 4 25	4 50 @
" (Star)	2 70 @ 3 00	*Not sold.*	*Not sold.*	*Not sold.*
K. B. & S. (Eng.) Portland	2 85 @ 3 10		3 35 @ 3 50	3 00 @ 3 25
Burham " "	2 60 @ 2 80		3 15 @ 3 35	2 75 @ 3 00
Vorwohler	2 65 @ 3 25		3 00 @ 3 25	
German (Fewer)	2 50 @ 2 70	3 15 @ 3 35	3 15 @ 3 35	
" (Alsen)	2 56 @ 2 80	3 00 @ 3 50	3 15 @ 3 35	2 90 @ 3 25
Selenitic		1 65	*Not sold.*	
Hydraulic Lime of Teil	3 50 @ 4 00		*Not sold.*	
Roman	2 75 @ 3 00	@ 3 20	2 75 @ 3 25	3 25 @ 3 50
Keene's coarse	5 00 @ 6 00	@ 7 50	7 50 @ 9 00	6 50 @ 7 00
" fine	9 25 @ 10 25	@ 11 50	11 00 @ 12 50	11 50 @ 12 00
Lime:				
Rockland and Rockport, (Com.)	@ 1 00	@ 1 10	*Not sold.*	1 00 @ 1 25
Rockland and Rockport, finish	@ 1 20	@ 1 15	*Not sold.*	*Not sold.*
State, com. cargo rates (nom.)	75 @ 80	*Not sold.*	*Not sold.*	*Not sold.*
State, finishing "	95 @ 1 10	*Not sold.*	*Not sold.*	1 60 @ 2 25
Plaster of Paris (calcined.)	1 30 @ 1 35	1 70 @ 1 90	@ 1 75	2 25 @ 2 50
" (casting)	1 50 @ 1 65	@ 2 25	@ 2 00	22 @ 30
Hair (Cattle) ₱ *bush.*	21 @ 23	@ 30	30 @ 35	
" (Goat)	30 @ 35	@ 30	35 @ 40	75 @ 1 50
Sand, ₱ *load*	1 00 @ 1 25	@ 1 50	100 @ 1 25	
STONE. (₱ *cubic foot, rough.*)				
Granite: (*Maine*)		@ 60		
Limestone:				
Bedford	@ 1 00	95 @ 1 00	50 @	3 75 @
Joliet	@		35 @ 55	
Lemont	@		35 @ 60	
Serpentine	@		80 @ 90	

(*Continued on page vi.*

10

For a Sash of 250 lbs.

"MORTON'S METAL"

(Registered Trade-mark, May 1st, 1883.)

Cable and Champion Sash-Chains

and Patented Attachments.

The most **RELIABLE** and **CHEAPEST** article in the market for suspending

Window-Sashes.

HAS GREAT TENSILE STRENGTH,

Can be easily applied to any window, and gives SATISFACTION wherever used. Samples sent to any Architect free on application. Now in use in all the leading cities throughout the United States.

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Champion Chain.

BUILDING MATERIALS.

	New York. (Wholesale Prices.)	Boston. (Prices to Builders and Contractors.)	Chicago. (Prices to Builders and Contractors.)	Philadelphia (Prices to Builders and Contractors.)
Foundation:				
Dimension	@	5 00 ℔ ton	20 @ 28	30 @ 5 00
Block	@	4 60 ℔ perch	8 50 ℔ cord.	50 @ 6 00
Rubble	@	1 25 @ 1 50	8 50 @	
Bluestone: (℔ *sq. ft.*)				
Sidewalk	30 @ 5 00	40 @ 1 75	75 @ 1 00	70 @ 90
Planed	50 @ 6 00	75	50 @ 1 00	1 10 @ 1 25
Sandstone.				
Longmeadow		75 @ 85		
Brown (Connecticut)	1 00 @	1 25 @ 1 45	1 50 ℔ cub. ft.	
Amherst	1 00 @	90 @ 1 00	55 @ 65	
Berea	75 @ 1 00	80 @ 90	45 @ 55	70 @ 90
Berlin	75 @ 1 00	80 @ 90	55 @ 65	
Bay of Fundy	@ 1 00	*Not sold*	*Not sold.*	
Belleville	80 @ 1 25	1 25 @ 1 35	"	
New Brunswick	@ 1 00	90 @ 1 00	"	
Caen	@	@ 2 00	"	
Marble:				
Lee, Mass.	@	1 75 @ 2 50	*Not sold.*	2 00 @ 2 50
Rutland, white	@	@ 3 00	3 50 @ 5 00	2 25 @ 2 50
Sutherland Falls	1 25 @ 1 75	@ 2 00	3 50 @ 5 00	1 50 @ 2 50
Glens Falls, black	@	2 00 @ 3 00	*Not sold.*	4 00 @ 4 50
Italian, blue-veined	@	50 @ 60	@ 4 40	— @ —
" Sienna	@	3 00 @ 3 50	*Not sold.*	3 25 @ 6 50
Tennessee, red	@	1 25 @ 2 50	@ 4 00	2 00 @ 3 00
" Knoxville	@	85 @ 90	@ 4 00	@ 1 50
Pennsylvania, blue	@		*Not sold.*	2 23 @ 2 50
Vermont, white	@	1 50 @ 2 00	3 50 @ 5 00	
Slate: Roofing (℔ *square*)	7 00 @ 8 00	4 50 @ 7 00	6 25 @ 8 10	@ 7 00
" green	7 00 @ 8 50	5 50 @ 6 50	@ 8 60	@ 7 00
" purple	@ 15 00	13 00 @ 14 00	— @ 16 00	5 00 @ 5 75
" red	— @ —	Brownville, Me.	7 20 @ 7 60	5 00 @ 5 75
" black, Lehigh	— @ —	6 50 @ 9 00	7 30 @ 8 00	6 00 @ 6 25
" " Chapmans	@	Monson, Me.	*Not sold.*	@ 15 00
Tiles, Am. ℔ M.		5 50 @ 8 00		
LUMBER.—℔ M. (*Ordinary dimensions.*)				
Boards:				
Pine, 1st quality, clear	65 00 @ 75 00	50 00 @ 53 00	44 00 @ 49 00	
" 2d quality	55 00 @ 60 00	42 00 @ 44 00	40 00 @ 46 00	
" 3d quality	18 00 @ 22 00	35 00 @ 38 00	37 00 @ 44 00	
Spruce	@ 25 00	11 00 @ 12 50	*Not sold.*	
Hemlock	ea. 17 @ 18	11 00 @ 12 50	@ 10 00	11 50 @ 15 00
Yellow pine	20 @ 40	30 00 @ 33 00	@ 28 00	16 00 @ 18 50
Cypress	@	32 00 @ 35 00	@	@
Clapboards:				
Pine	@	33 00 @ 55 00	14 00 @ 22 00	—@—
Spruce	@	23 00 @ 30 00	*Not sold.*	—@—
Framing Timber:				
Pine			13 00 @ 15 50	25 00 @ 35 00
Spruce	14 00 @ 18 00	13 50 @ 14 50	*Not sold.*	18 50 @ 20 00
Hemlock	12 00 @ 15 00	@	13 00 @ 19 00	12 00 @ 13 00
Yellow pine	20 00 @ 30 00	21 00 @ 25 00		22 00 @ 24 00
Laths:				
Pine	@	2 00 @ 2 25	2 25 @	—@—
Spruce	2 15 @ 2 25	2 15 @ 2 25	*Not sold.*	2 40 @ 2 60
Shingles:				
Pine, shaved	5 00 @ 6 00	@	*Not sold.*	
Pine, sawed	4 00 @ 5 60	@ 4 50	2 25 @ 2 60	
Spruce, sawed	2 50 @ 2 75	@ 1 50	*Not sold.*	
Redwood	2 10 @	@ 3 00	5 50 @ 8 00	30" $10 @ 28
Cedar, split	@	@	*Not sold.*	24" 8 @ 21
Cedar, sawed	@	2 00 @ 3 50	@ 2 30	20" 5 50 @ 14
Cypress 7 x 24.	18 00 @ 20 00	5 50 @ 6 00	*Not sold.*	16 00 @ 20 00
Miscellaneous:				
Piles ℔ ft.	4½ @ 6	Piles 6c. ℔ ft.	*Not sold.*	
Fence pickets, Spruce	8 00 @ 10 00	10 00 @ 18 00	Pine, 8 @ 22	12 00 @ 14 00
Cedar posts, 9 ft. (sq. posts.)	@	25 @ 35	9 00 @ 21 00	70 @ 1 25
Chestnut "	@	25 @ 35	*Not sold.*	28 @ 36
Finishing Woods: ℔ M. (*First Quality, Kiln-dried.*)				
Ash	@ 55 00	38 00 @ 48 00	35 00 @ 40 00	
Cherry	80 00 @ 120 00	60 00 @ 90 00	75 00 @ 85 00	55 00 @ 65 00
Chestnut	@ 55 00	38 00 @ 50 00	45 00 @ 50 00	60 00 @ 80 00
Butternut	40 00 @ 60 00	60 00 @ 70 00	45 00 @ 60 00	55 00 @ 65 00
Mahogany, Baywood	@ 180 00	100 00 @ 150 00	150 00 @ 180 00	100 00 @
" St. Domingo	@ 350 00	180 00 @ 250 00	250 00 @ 330 00	
Maple	45 00 @ 50 00	45 00 @ 65 00	30 00 @ 35 00	30 00 @ 50 00
Oak, red	@ 70 00	@ 50 00	35 00 @ 40 00	35 00 @ 45 00
" white	@ 70 00	@ 55 00	35 00 @ 40 00	55 00 @ 65 00
" quartered	@ 90 00	65 00 @ 70 00	50 00 @ 55 00	70 00 @ 80 00
Sycamore quartered		@ 65 00		
Pine, clear	65 00 @ 70 00	30 00 @ 65 00	45 00 @ 50 00	65 00 @ 90 00
Redwood	70 00 @ 75 00	60 00 @ 70 00	60 00 @ 70 00	100 00 @
Rosewood ℔ lb	@ 6		@ 7	
Walnut, black	125 00 @ 150 00	85 00 @ 100 00	80 00 @ 120 00	160 00 @ 200 00
Whitewood	45 00 @ 50 00	38 00 @ 45 00	@ 30 00	20 00 @ 30 00
Yellow pine ℔ M	@ 45 00	40 00 @ 45 00	30 00 @ 35 00	30 00 @ 35 00
Gumwood, best red			30 00 @ 35 00	
PAINTS. (*In oil,* ℔ *lb.*)				
White lead, Am. (℔ lb.)	6¼ @ 6½	5½ @ 6	5½ @ 5½	4 @ 6½
" Zinc, "	5 @ 8½	8 @ 12	7 @ 11	4 @ 8
Red, Am.,	6 @ 6½	@ 12	5½ @ 6	
" Venetian	6 @ 10½	7 @ 12	1½ @ 2½	4 @ 6½
" Vermilion	55 @ 60	55 @ 60 dry	50 @ 75	Am. 12 @ 16
Red Indian, Eng	12 @ 20	14 @ 20	12 @ 20	12 @ 16
Yellow Ochre	6 @ 15	7 @ 12	3 @ 15	4 @ 9
" Chrome	12 @ 20	18 @ 25	12 @ 25	12 @ 25
Green (chrome)	8 @ 13	12 @ 20	8 @ 20	9 @ 14
Green, Paris,	16 @ 20	25 @ 40	16 @ 35	14 @ 29
Black, lamp	8 @ 12	15 @ 25	8 @ 30	12 @ 18
Blue, ultramarine	12 @ 18	18 @ 30	10 @ 35	20 @ 35
Oil, linseed, (raw) (℔ gal.)	53 @ 54	54 @ 59	48 @ 49	54 @ 58
" " boiled (℔ gal.)	56 @ 57	57 @ 62	51 @ 53	57 @ 60
Turpentine (℔ gal.)	30 @ 31	35 @ 42	32 @ 34	38 @ 41
Varnish, coach (℔ gal.)	@	1 50 @ 6 00	1 25 @ 2 00	1 40 @ 4 00
Shellac (℔ gal.)	@	2 50 @ 3 00	3 25 @ 4 00	1 75 @ 3 00
Putty (℔ lb.)	2 @ 3	2 @ 4	02 @ 03	2 @ 2½
Whiting (℔ cwt.)	50 @ 90	1 @ 1½	1 @ 2	¼ @ 7-10
Paris white, (Eng.,) (℔ cwt.)	30 @ 2 00	2 @ 3	2 @ 2½	1 30 @ 1 60
Litharge, Am. (℔ cwt.)	5½ @ 5½	6½ @ 7	6½ @ 10	6½ @ 7
Sienna, (burnt) (℔ cwt.)	12 @ 17½	14 @ 20	4 @ 16	9 @ 14
Umber, " (℔ cwt.)	11 @ 16½	14 @ 20	@ 10	9 @ 14

(*Continued on page* vii.)

FOR HEAVY SASH

USE

RAYMOND'S

Compressed Lead Sash Weights.

With Wrought and Malleable-Iron fastenings.

Twice the heft of iron. Occupying only half the space.

Prices no higher than the ordinary cast lead-weights.

Freight allowed to any part of the country.

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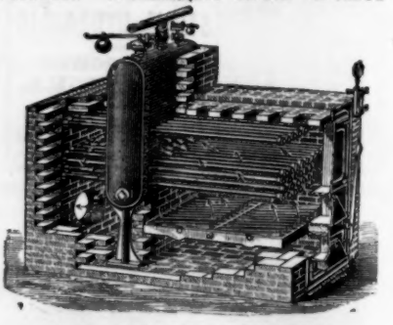
THE HOLLAND

Patent Wrought-Iron Boiler



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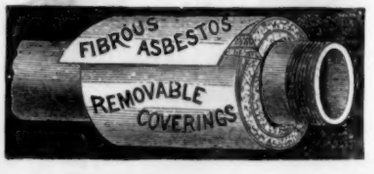

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Asbestos Building-Felt, Fire-Proof Cements, &c.

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78 & 80 Lake Street, - Chicago, Ill.

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BRADLEY'S

FOR BOILERS AND STEAM PIPES.

Reduces Condensation of Steam.

FOR GAS AND WATER PIPES.

Prevents Sweating and Freezing.

The best Non-Conductor of Heat and Cold in the World.

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In various forms, viz: — **Air-Warming Grates, Fireplace Heaters, School-Room Heaters, Stoves, Double Heaters,** Each combining the ventilation of an open fire with the power and economy of a warm air furnace.
"Palace King Furnaces."
OPEN STOVE VENTILATING CO.,
78 Beekman St., New York.

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FURNACES,
For burning Coal-dust, Sawdust, &c., will save from 50 to 90 per cent in your Fuel Account
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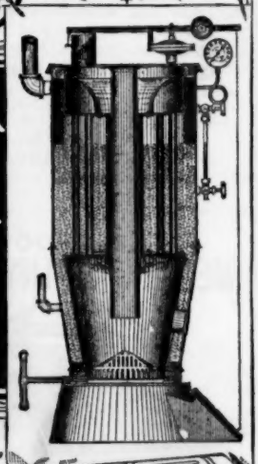

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Low Pressure, Self Regulating, Durable, Economical, Cheap.
UNIFORM HEAT. NO GAS. DUST, OR SMOKE. NO OBJECTIONS.
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MANUFACTURED BY
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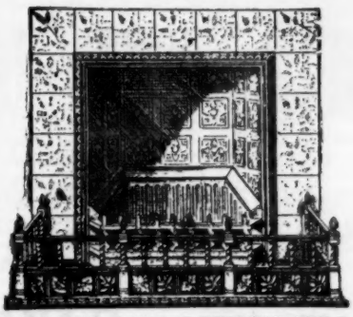
Newell Universal Mill Co.

PHILADELPHIA GRATE WORKS.
THOMAS S. DIXON & SONS,
MANUFACTURERS OF
FINE GRATES
Furnaces, Ranges.



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IMPORTERS OF ENGLISH AND FRENCH FIRE-PLACE FITTINGS.
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DETROIT STEAM RADIATOR CO.'S Patent Cast Iron Steam Radiator.

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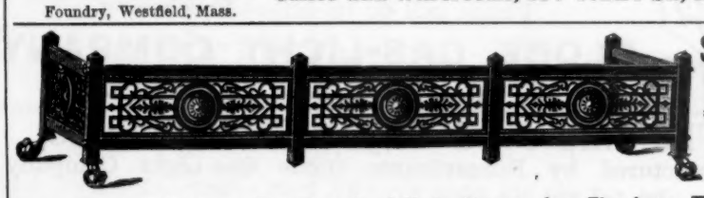

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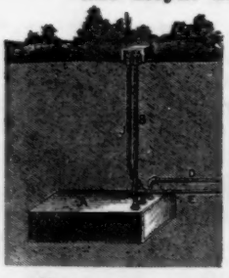

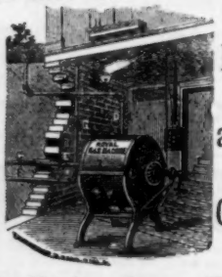

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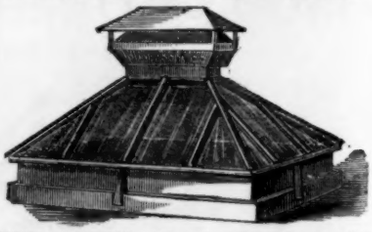

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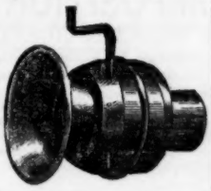

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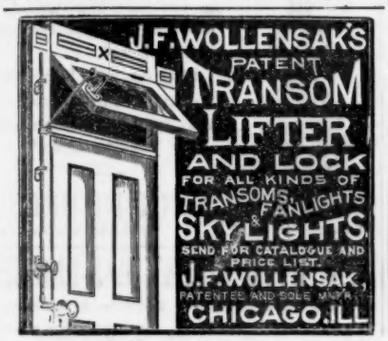

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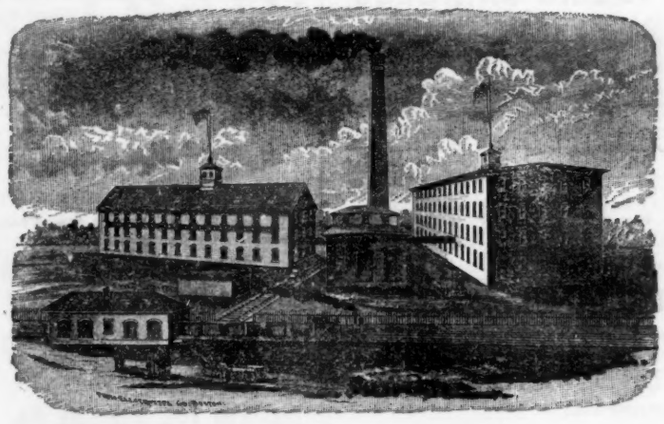

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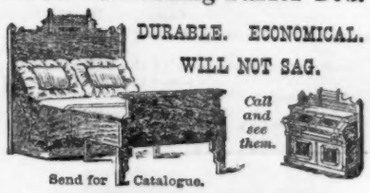

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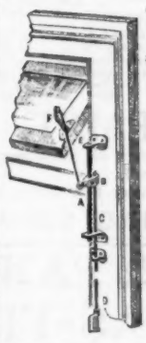

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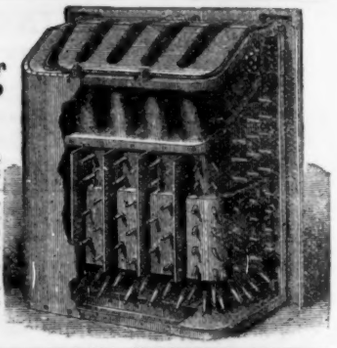

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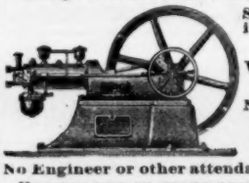

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NOVEMBER 1, 1884.

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NOTES AND CLIPPINGS. 214

REPORTS of the proceedings at the recent Convention of the American Institute of Architects at Albany have not yet reached us; so we are only enabled to announce that the following officers were elected for the ensuing year: President, Thomas U. Walter, LL. D., of Philadelphia; Treasurer, O. P. Hatfield, of New York; Secretary, George C. Mason, Jr., of Newport, R. I.; Board of Trustees, H. M. Congdon, E. T. Littell, Napoleon Lebrun, and A. J. Bloor. Committee on Publications, H. Hudson Holly, of New York, T. M. Clark, of Boston, and J. McArthur, Jr., of Philadelphia. Committee on Education, Alfred Stone, of Providence, Henry Van Brunt, of Boston, Prof. N. Clifford Ricker, of Champaign, Ill., Prof. W. R. Ware, of New York, and T. M. Clark, of Boston. Secretary of Foreign Correspondence, W. L. B. Jenney, of Chicago.

THE Bulletin of the Entomological Division of the Department of Agriculture calls attention to the ravages of a certain worm among the spruce forests of Maine, pointing out such facts in regard to the mode of attack of the insect, and its habits of life, as may best suggest a remedy. The "spruce bud worm" is the larva of a moth, resembling that which produces the common measuring-worm, and like the measuring-worm moth, it deposits its eggs in the spring in the tender shoots of trees, choosing the spruce, as other insects of the same kind do other trees. The worm hatches out in June, just as the young growth of the trees is developing, and immediately begins to feed upon the buds, which are soon devoured. Unlike most other trees, the spruce puts forth annually a comparatively small number of buds, which are developed from the ends of the twigs, and when these are eaten away, as there are no surplus buds to grow in place of them, the tree dies. The pine tree, in some localities, has for many years suffered in the same way from a worm which attacks the terminal bud on the leading shoot, causing rather the distortion of the tree than its destruction, but the spruce worm leaves the forests dead. Extensive tracts of this brown woodland now occupy the coast of Maine west of the Penobscot River, and although the insect seems to have advanced as yet but a few miles inland, it is likely to reach before long the best forest regions of the State. There is something interesting, as well as ominous, in the way in which certain insects appear, no one knows whence, or how, and in a few years almost extirpate some particular plant from a whole country. The little phylloxera, which a few years ago came near putting an end to the culture of the grape in France, presents a signal example of the power of an insect plague; and the Colorado beetle, the pine worm, and more recently the spruce worm and the elm beetle, threaten to compel the abandonment of woodland property of great and increasing value. The secret of the increase in the destructive power of insects is probably to be found in the reckless cruelty with which birds, the natural enemies of insects, have been killed or driven away from the more thickly settled parts of the country. It is often remarked that in comparatively wild regions injurious insects are almost unknown, and the prevalence in a given locality of cats and boys is always indicated, in summer, by gardens and orchards brown and leafless, hung with worms instead of flowers and fruit.

THE Builder gives an interesting account of the new temporary hospital for infectious diseases, just constructed at Liverpool. This city has been very inadequately provided with means for isolating and treating persons attacked by infectious disorders, and it was not until an epidemic of small-pox broke out there recently that decisive steps were taken for supplying the need. By the courtesy of the Board controlling the harbor and docks, a tract of land, containing about thirty acres, situated on the river bank, was placed at the disposal of the city authorities, and immediately put in condition for receiving the hospital buildings. A mansion-house already existing on the premises was appropriated as an administration building, and at some distance from it, on the river bank, two terraces were formed, each four hundred and ten feet long, and forty feet wide. The terraces were carefully underdrained, and then entirely covered with a sheet of Portland cement concrete, six inches thick. This forms a floor, on which the hospital buildings are constructed in sets of three. Four of these triplets of buildings are of the lightest possible description, the central portion being of wooden framing, covered outside with thick water-proof paper, and sheathed inside with matched boards, the space between the sheathing and the outside papering being filled with mineral wool; while the two remaining divisions consist simply of tents. The latter form the hospital wards, the wooden structure in the middle containing only nurses' day-rooms, bath-rooms, water-closets, and so on. All the central buildings communicate by means of covered passageways, floored with cement concrete, and enclosed with wooden framing, covered with water-proof paper. To accommodate patients who could not bear the exposure of a tent, two triplets of buildings are placed in the same range as the tents, planned in the same way, but constructed of corrugated iron, with lining of matched sheathing, filled in, between the sheathing and the iron, with mineral wool. A separate convalescent hut, of iron, is provided at one end of the group, and kitchens, sculleries, and other necessary buildings, of brick, are situated near by.

THE plan of heating is a novel one. Circular open grates are placed in the centre of each tent or iron ward building, to give radiation and ventilation, and in addition to this steam pipes run around the outside walls, conveying steam which is generated in the fireplace itself, by means of a coil of pipes, some of which form the grate-bars. We confess to a little doubt as to the efficiency of such an apparatus, unless hot water were substituted for steam, but this change could probably be made without difficulty. The drainage system is less remarkable, but seems to be well designed, one noticeable feature being the provision of flush-tanks at the head of each line of drains, which are supplied from special tanks with a strong solution of carbolic acid. The flush-tanks are set to discharge four times in every twenty-four hours, and the mixture of the water which fills them with the carbolic acid solution gives it a strongly disinfectant quality, and perhaps assists in destroying the poisonous germs which the drains may contain. In order to prevent the possibility of communicating infection through the city sewers, a special sewer is laid, carrying the drainage from the entire hospital directly to the river. As the site was found to be exposed to severe winds, the unusual plan was adopted of building a screen, thirty feet high, and six hundred feet long, to protect the buildings and the patients in them. This screen is made of poles, set six feet apart, with horizontal battens every fifteen inches in height, and laths over the whole. Wire ropes at suitable intervals prevent the screen from being blown over. The entire cost of the hospital, exclusive of the land and the administration building, is less than sixty thousand dollars; which, considering that it will accommodate two hundred patients under very favorable conditions, is moderate.

THE Sanitary Engineer quotes from the *Bulletin of the Bussey Institution* a description of some experiments made by Professor Storer to determine whether mice were likely to eat away the putty used by plumbers for making certain joints, so as to endanger the tightness of the joint. Every one knows that they, as well as rats, will occasionally eat putty, and for that reason it is common for plumbers to mix red lead with the putty used in making joints; but before Professor Storer's experiments were made, very little was definitely known about the subject. To find, first, how much putty a mouse would eat, he put three in a cage, and fed them with scanty rations of oats, but gave them in addition all the putty they wished for. Under these conditions the mice ate about one-third their weight of putty every day, showing that where they can get no other food, these little animals are capable of doing much mischief to plumbing work where this substance is used for jointing. After the mice had become accustomed to plain putty, they were tried with mixtures colored with various pigments. Red ochre was first given them, mixed with one part whiting to three parts ochre and the usual proportion of oil. This compound they would not touch; but putty made with equal parts of ochre and whiting they would eat, though not very freely. Putty made entirely of yellow ochre instead of whiting they at first refused, but were gradually brought to eat it. A compound of oil and clay was offered them, but they would not eat it unless whiting was mixed with it. The carbonate of lead, baryta, and zinc, and oxide of zinc, all proved fatal, even in small doses, to the mice that ate them, but these pigments, when adulterated with whiting, seemed to lose something of their deleterious quality, and the mice could eat a certain quantity with impunity.

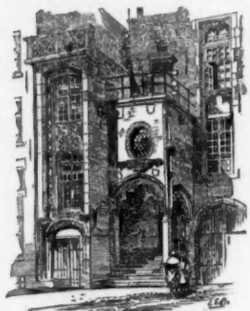
THE *Builder* gives a curious account of a "competition" which took place in some country town between candidates for the position of local surveyor. As those officials are more numerous in England than here, the circumstances of the examinations through which they obtain their appointments are not of such serious consequence to us, but perhaps some of our readers may remember occurrences in which they have been concerned which will be recalled by the account of this one. A choice was to be made among a certain number of candidates, selected from many applicants, by a committee of town magnates of the usual sort, and one of the candidates, who seems to have understood human nature quite as well as engineering, paved his way to success by the ingenious device of having his testimonials and references printed in brown ink on tinted paper, with his own photograph as a frontispiece, and distributing these documents among the committee. This "little attention," as the *Builder* calls it, won the hearts of the judges from the first, and he was appointed to the post. His luckless competitors, who had not thought of this way of ingratiating themselves, were examined, with unfavorable result, upon problems such as that propounded by one of the committee, a shoemaker of much authority, who inquired "how much water a windmill would pump in a year?" while another requested the candidate under trial to state "what size drain-pipe should be laid in a certain street?" and seemed, with his fellow committee-men, to be unfavorably impressed with the reply of the candidate, who said that it would be necessary for him to know the length and grade of the street, and the number of houses on it, before he could answer the question. Absurd as such questions seem to professional men, they do not appear so to those that ask them, who are not accustomed to consider the various conditions affecting any particular case, and many queries, just as ridiculous, are put with the utmost gravity to architects. We remember being asked, quite seriously, "how much a school-house ought to cost?" without any further particulars whatever. Having a general notion of the sort of school-houses fashionable in the surrounding region, we hazarded a bold guess, and answered promptly, "Twenty-five thousand dollars," and gained thereby the reputation of great sagacity, as having estimated within a few dollars the cost of a building which we knew absolutely nothing about.

EVERY one may not know that a very important agreement has recently been entered into by the Governments of Great Britain, France, Italy, Belgium, Spain, Holland, Portugal, Switzerland, Servia, Brazil, Guatemala, San Salvador, Ecuador, and Tunis, for the formation of an International Union for the Protection of Industrial Property, under the rules of which "the subjects or citizens of each of the contracting States shall enjoy, in all the other States of the Union, in everything that concerns patents for inventions, designs, models, and trade-marks, the same advantages that the law of these States accords to their own citizens, including the same protection, and the same legal remedy against persons infringing their rights, on the sole condition of submitting to the formalities and regulations which each State imposes on its own citizens." Under the same treaty it is agreed that commercial names shall be protected in all the States belonging to the Union, by the seizing, at the request, either of the party injured, or a diplomatic representative, of articles imported into any of the Union States under a fictitious name of a person or place, or otherwise marked in a way calculated to deceive purchasers, or to injure the business or reputation of established manufacturers; and, moreover, that applicants for patents or inventions, who have filed their application in any one of the treaty States, shall be entitled, by that act, to a term of six months for European countries, and of seven months for countries beyond the sea, within which he shall have the right, prior to all others, to file applications for patents in any or all the other States of the Union, in accordance with the regulations of each State in regard to patents.

IN many countries the holder of a patent is obliged, under penalty of forfeiting his exclusive rights, to proceed within a given time after the granting of his patent to the manufacture of his protected goods, or the application on a commercial scale of the process which he has devised; and the regulations of the Union do not change these local laws, but the privilege is given to any inventor who may have secured patents in two or more of the contracting States to import from one into another the articles made under his patent, without forfeiting them, provided that he complies also with the rules of both countries in regard to the local manufacture of them. This, like many of the other stipulations of the treaty, is of great importance to the inventors of improved articles, and to those who deal in them; while the shameless forgery of trade-marks and labels which is carried on in this country shows plainly enough how valuable to honest manufacturers would be an effective repression of such practices. In order to carry out the provisions of the treaty, an International Bureau is to be established, under the protection of the Swiss Government, which will have general supervision of the management of industrial property, and is to collect and publish statistics, and answer questions submitted to it. Besides this International Bureau, each of the treaty States will establish a local Administration, which is to gather information for transmission to the central Bureau, and is to publish a periodical account of matters relating to the subject in each country.

ACCORDING to the *Academy*, Dr. Schliemann has made some important discoveries at Tiryns, perhaps the most ancient Pelasgic town in Argolis, and the scene of the early life of Hercules. The palace of the city, through whose hall the centaur Chiron may have trotted when he went to give music lessons to his athletic pupil, has been excavated, and found, like that at Mycenæ, to show marks of fire, the clay with which the limestone walls are laid, instead of mortar, being converted into brick, while the stones are burnt into lime. In some places the walls are covered with stucco, which still shows traces of painting in black, blue, red, yellow and white. The blue pigment has been analyzed and found to contain glass and copper. The plan of the palace and the character of the objects found in it recall those of Orchomenos and of the second prehistoric city of Hissarlik, or Troy, but there are many knives and hammers of stone, indicating an antiquity for the palace and city more remote than for those of Mycenæ. No trace of writing has been met with, although intelligible drawings are found, as well as a decorative pattern, which is the same as that found on the ceiling of one of the rooms connected with the so-called Treasury of Minyas at Orchomenos. Twenty-seven bases of columns of limestone have been found among the ruins, and one capital, in the ancient Doric style, which, however, is of sandstone, and may be a fragment of a much later building, since at Mycenæ, where much more has been excavated, the forms are completely different from those of the Doric order, resembling the Assyrian more than any other style.

SALTPETRE EXUDATIONS UPON BRICKWORK.—I.



House in Bruges: Belgium.

USUALLY in the spring and about this time in the autumn it is not uncommon to see brick walls covered in places with unsightly whitish blotches on the surfaces. These efflorescences are especially noticeable when such walls are constructed of an outer facing of fine pressed-bricks, and an inner or main wall or backing of common bricks. Architectural enrichments of brickwork, such as decorative panels, friezes, etc., when made of terra-cotta, which is but brick in ornamental form, are also often covered with these objectionable exudations, which mar and detract from the beauty of designs which would otherwise appear more harmonious and pleasing. When heavy rains are prevalent, and at all seasons in damp positions, in old works as well as new, these efflorescences are most noticeable, and they appear to be composed of a crystalline, semi-transparent substance, of a white, fleecy appearance, suggestive of hoar-frost. It is of a slightly acid, or rather of a pungent, saline flavor, and works its way through any ordinary coat of paint, and, as the substance absorbs the humidity of the atmosphere in effloresecing, it renders the wall damp on the surface, and if there should be paint covering the brickwork, it carries it off in large patches.

The process is termed by the English workmen "saltpetring," and sometimes in this country it is called "whitewashing," but it is in fact the production of nitre, or, as it is also called, saltpetre, from the materials employed in the construction of walls. The term "stone-salt" has also been applied to the substance, as it sweats out of or exudes from rocks or walls.

In brickwork these saltpetre exudations are due primarily to soluble alkalis and alkaline earths present as impurities in the lower grades of clays from which building-bricks are made, and to the lime and magnesia from calcareous pebble deposits present in most of these clays; also to the lime and magnesia of the mortar with which the common bricks are laid.

Saltpetre is a salt consisting of nitric acid and potassa — nitrate of potassa, and although it is usually regarded as the sole cause of the appearances which have been described, it is far from being the only substance produced in particular instances, as the nitrate of soda and the chloride of potassium are often met with in connection with saltpetre. But few chemists pay attention to the fact that nearly all limestones contain a certain quantity of soda and potassa; or at least in the analyses contained in chemical works mention is but seldom made of their presence.

The disagreeable effect which saltpetre produces upon decorations, internal as well as external, should render the research of its cause highly interesting to the architect and to the builder. Its action of greatly lessening the durability of stone, as shown in the appearance of portions of the new Parliament Building in London, and the archways under the eastern porticos of the Capitol Building, and the lower or older portion of the great Washington Monument in Washington, is such that the study of this singular chemical phenomenon should engage the attention of engineers to an equal extent.

Saltpetre is not always caused by the material of which the bricks are made, but sometimes by the sand, and, as has been stated, often by the lime employed in making the mortar. Sea-sand, unless washed in fresh water, and exposed for a period of not less than one year, always produces it. The evil is further promoted by the general manner of constructing walls when pressed-bricks are used as a facing. Such walls are usually built with the facing of one width of a pressed-brick, the other part, or "backing up," being of one or more lengths of common bricks to form the thickness desired. Pressed-bricks are as a rule made of even, straight surfaces, so as to form sharp and well-defined arrises, and of suitable size to lay a close joint for "tucking," while common bricks are roughly made, have uneven surfaces, and are laid with a wide, thick joint.

In building a wall faced with pressed-bricks, the latter are laid in advance of the common bricks, usually six courses high, when they are "backed up," or the wall is "filled in" with common bricks to the height of the six courses of front bricks. It is the common custom among bricklayers to make five courses of "salmon" bricks, which are commonly used for "backing up" walls faced with pressed-bricks "come level" with six courses of the latter. In order to accomplish this it is necessary to greatly increase the thickness of the mortar joints for the common bricks. Realizing that mortar is cheaper than bricks, the bricklayers "shovel it in," and hence it is that many expensive structures built with pressed-brick fronts have inside walls composed almost wholly of lime mortar. When such walls become thoroughly wetted, either during or after construction, the result is that the saltpetre exudations at once commence. Then again, the manner of tying the facing course of pressed-bricks to the common bricks, or "backing up," further aggravates the evil.

When the six courses of pressed-bricks are laid and backed up, as has been described, it is the custom to split a sufficient number of pressed-bricks, so as to make one brick appear like two when laid "stretcher fashion," in the wall. Thus it happens that walls that are faced with pressed-bricks, laid so as to appear like all stretchers, have each seventh course only about two and one-fourth inches in thickness, instead of a full brick or four and one-half inches.

The "split course" is then tied to the common bricks by interlacing courses of rough bricks, termed headers, which are made to penetrate and overlap the longitudinal rows of strechers at every "split" or seventh course. This manner of bonding the facing bricks to the common bricks is called a "blind tie;" but such ties are highly objectionable, on account of the intimate capillary contact of the facing and common bricks and with the mortar, which inoculate and supply the effloresecing germs to the front or pressed-bricks.

It was not our intention to make this paper a treatise on the construction of walls; but we would feel that our whole duty was not performed if we failed to express our disapprobation of the manner of building walls faced with pressed-bricks and constructed, as we have described, with "blind ties."

Such walls are weak, and the construction is meaningless and a sham. An examination of the exterior of such a wall would be unfruitful, as rows of stretchers, laid course upon course from the bottom to the top of a building become monotonous, and the continued dull uniformity becomes wearisome. In addition to the annoyance arising from the poverty of ideas expressed by such a wall, we are disappointed at knowing that soft, salmon bricks are often within one and one-half or two inches of the exterior, and tremble for the safety of the occupants of a structure the front or veneering of which is blindly tied to a rotten wall, the principal material of which is lime mortar.

But to return to the subject of "saltpetring," from which we have strayed farther than was our intention. It is also the custom in constructing such walls as we have described, to use for the pressed-bricks a mortar-paste made of bone or marble dust combined with sand and a suitable coloring matter, such mortar being laid on sparingly; while the common bricks are laid, as we have described, with very thick joints of common lime-mortar, this mortar being grouted into the joints and between the contiguous front and common bricks, thus making the entire wall of pressed and common bricks practically one body.

The substances of the wall coating are sulphate of soda, sulphate of magnesia, and sulphate of lime, the first being commonly present in variable quantities in the clays, especially the drift-clays, being the result of igneous agencies and of chemical changes. In the second case, the magnesia in the brick clay or magnesia in the lime of the mortar is converted into the sulphate of magnesia, either by the sulphurous fumes evolved in the process of burning in the kilns, from iron pyrites present in the clays or the sulphurous fumes of the fuel, or by the absorption of sulphurous vapors of coal-gases from the general atmosphere. A like conversion takes place from the lime of the clay and mortar, which is converted into the sulphate of lime. These salts are dissolved by the water with which the common bricks are generally saturated just prior to laying them in the wall, to prevent the too rapid absorption of the water from the mortar by the bricks, which would cause the mortar to set too rapidly. The water of the mortar-paste used for laying the pressed-bricks also dissolves the salts which have been mentioned, and which are readily absorbed by the dry facing-brick of the wall, and evaporating through the pores of such bricks and effloresecing upon the surface.

During the autumn of 1882, more of this efflorescence was to be seen upon buildings on both sides of the Atlantic than had appeared for many years, and old structures, such as the Pennsylvania Hospital, in Philadelphia, which were usually free from it, appeared to have developed as much of the deposit as those in process of erection, as for instance, the new Technical College at South Kensington, London, which was also covered in places with this objectionable eruption.

What this efflorescence was, and the cause of it, was investigated by scientific societies, some of the members of the Academy of Natural Sciences, in Philadelphia, discussing it at length. The substance of their decision was, that it was simply ordinary Epsom salts or sulphate of magnesia, which dissolved in the water passing over the bricks, and in evaporating left the deposit; the sulphurous acid resulting from burning coal combining in the presence of moisture with the magnesia in the mortar and forming the salts.

The earth's surface has from the most ancient times been known to yield nitre, which appears in some cases as an efflorescence on soil. W. J. Palmer[1] describes the manner in which a class or caste of men, called *sorawallahs*, from the Hindu word *sora*, meaning nitre, collect the earth impregnated with that material in the northwestern provinces of India. When the *sorawallah* detects a faint, white, veil-like patch of crystalline formation on or near the dark-colored borders of the little drains, which issue from holes in the mud-walls, usually found around native dwellings and their cow-houses, he scrapes off a very thin layer of the surface soil, which proves to be impregnated with nitre, and carries it to his place of manufacture. The nitre thus obtained, when re-crystallized, forms the East Indian saltpetre so well known in commerce. The mounds which cover the sites of ancient villages in Northern Africa, especially in Algeria, are lixiviated for nitre. Other instances of the marked production of nitrates also occur at Saragossa, a province of Spain founded by Augustus more than nineteen hundred years ago. Large quantities

[1] *Chemical Society's Journal*, Vol. VI, 1868, 318.

of nitre are also obtained from the province of Ancient Murcia in Spain, and it is shipped largely from Carthagena. But by far the most enormous formation of sodium nitrate to be found in the world is that on the table-land of Tamaragual in Peru.

The instances which have been cited, and others which might be named, prove that nitrates are widely distributed in nature. But it has been proved by chemical analysis that there is a much more general distribution of nitrates than would be supposed even from the examples which have been mentioned. In truth, nitrates occur in all soils and porous rocks, being, of course, more largely found in rich or well-manured soils.

Efflorescences of nitre on stone and brick are most abundant when these materials form the shelter for animals. The walls and roofs of caves frequented by animals are often covered with saltpetre exudations, which are often not less abundant in stables, especially those that are dark, and in which soft or porous bricks have been employed for constructing the interiors.

The earliest manufacture of nitre was by the lixiviation of old plaster, and of the earthen floors of stables, cottages, etc., wood-ashes being added to convert the nitrate of calcium into nitrate of potassium. Nitrification, in addition to the evil effects of keeping the walls of stables damp, and undermining the health of horses, also hastens the destruction of the fine finish or gloss of carriage varnishes, especially if the carriage-house is not well ventilated, and separated from the quarters of the animals. Many architects and builders plan and erect stables and carriage-houses, as if, at some time, they expected the structures would be converted into nitre factories, and to save the expenses of alterations in the future, they at once construct nitre factories, and use them for stables and carriage-houses. Four walls, with a narrow door leading to the stalls, and two wide doors to the carriage-house, the whole covered with a steep roof, upon the apex of which is secured a weather-vane in the shape of a trotting or running horse, the designs of which are usually unnatural, awkward, and inartistic, do not, from the mere fact that they are brought together in an incongruous whole, make a suitable habitation for a horse any more than they would for a man or other animal. Some of the economical souls who construct nitre factories, for fear that a portion of the nitre which is formed by the decomposition of the animal droppings and urine, will not allow the poor beasts which may be imprisoned in them to have necessary air, so they leave no openings in the shape of windows or breathing holes. Even the key holes are provided with guards, which automatically drop the instant the door is closed, and the key withdrawn. Other slightly more liberal architects and builders leave small orifices in the walls, so that the animal may inhale a small quantity of air; but, for fear that too much might enter, the openings are often built up with bricks in pigeon-hole fashion, or covered with fine gauze netting, either of which soon become clogged up, and thus most of the nitre generated in the factory is confined in it.

But nature is its own avenger, for by undermining the health, crippling with rheumatism, and finally killing the horses or other animals which may have been enclosed in the factory, it thus provides itself with additional animal matter to continue nitrification. In addition to the loss of the value of the horses and other animals which are destroyed in these nitre factories, sometimes nice, new, "shiny" carriages are placed in them; but in a few weeks the gloss and beauty changes to an ugly, yellowish mottled color. Then the owner of the animals which have been destroyed, and the carriage which has been ruined, discharges the man having the care of the nitre factory for killing the horses and pouring ammonia over the new carriage. The man who is discharged is sometimes called a hostler, and sometimes a coachman; but as we have before stated, the nitre factory is often termed a stable and carriage-house.

But let us again return to our subject. It is only after long-continued dry weather, for which the past summer has been so remarkable, that nitrates are found in maximum amount, for it is then that the water of the subsoil is brought to the surface by capillary attraction, and the salts held in solution have accumulated there as the water evaporates. Thus it happens that brick-clays, especially those from shallow banks, are liable to contain the greatest amount of nitrates when dug and used in seasons of drought. Heavy rains wash the nitrates out of the surface soil into the subsoil, and it is after such seasons that they are found in minimum quantity.

Non-efflorescence is not always an indication that a soil or porous rock may not be very rich in nitrates, as efflorescence commonly occurs when the nitric acid is combined with potassium. The nitrate of calcium is the nitrate which is most generally present in soil; but nitrate of calcium is exceedingly deliquescent, and, in fact, so great is its affinity for moisture, that it would not appear as a dry salt, even under the most inviting conditions of climates.

Most of the governments of the countries of Continental Europe, appreciating the necessity of obtaining nitre for the manufacture of gunpowder, early offered large prizes for the best method of obtaining saltpetre. But the processes thus engendered are now superseded by the production of nitre by means of the reaction between Peruvian nitrate of sodium and chloride of potassium. Dehérain[1] in investigating the formation of nitre in the walls of stables, came to the conclusion that its development was due to the simple oxidation of the ammonia vapors in the porous brickwork. But this theory has been modified upon the assumption that the disposing influence of other oxidizing actions induces the oxidation, and by the substitution of the action of ozone for that of the oxygen of the air. P. Thenard, Knop, Haarstick, and Pesci hold a view that further modifies the above theory, and regard ferric oxide as the agent for the conversion of ammonia into nitric acid. It is probable that the opinion most commonly held by modern chemists is that which explains nitrification as due to the oxidation of ammonia.

[1] Würtz, *Dict. Chim. pure et appliquée*, ii, 564.

THE HEATING AND VENTILATION OF THE NEW INSTITUTE OF TECHNOLOGY BUILDING.[2]

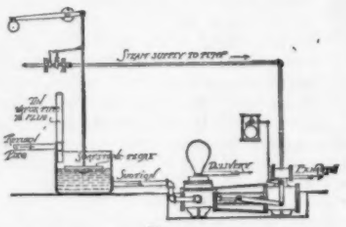
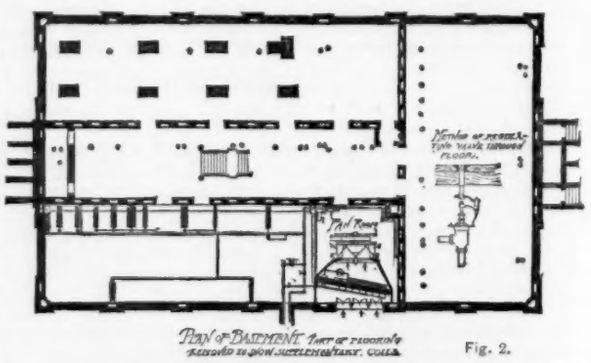


Fig. 1.

Mr. S. H. Woodbridge, Instructor in Heating and Ventilation at the Institute, recently read the following paper on "The Heating and Ventilation of the New Institute Building, and the Special Principles involved," before the Society of Arts.

Mr. Woodbridge said: The nature of the subject and the small number of careful measurements which have been made, render exact statements impossible, owing to the variable factors involved and the unknown nature of some of the constants. All my statements are, therefore, made in round numbers. Moreover, the building has not been planned with special reference to any accepted system of ventilation, and only the circumstance of hollow walls has rendered the introduction of such a system possible. Some imperfections therefore exist, which are well understood, but which could not be avoided. The inception of the work was characterized by the very unusual course pursued by the building committee in refusing to commit the planning and the execution of the plans to the lowest bidder. The plans for a generous and complete system of ventilation were first drawn up and adopted, and an engineer was sought whose sympathy with the work would insure its successful completion. He was told: "So much air is required, and these are the plans for the distribution; your work is to furnish the means of heating this air-supply without obstructing its passage."

Some of the more prominent features of the heating and ventilation system adopted are: the reversal of the ordinary custom of subordinating ventilation to economy in heating; basing the quantity and distribution of air on determined requirement rather than on cubic capacity simply; the use of large areas of air-passages and low velocities; making the outlet areas smaller than the inlet areas, with a view to an excess of internal pressure; the method of passing the air through the rooms, with a view to its most efficient and economic use; some peculiar features of the inlet and outlet flues; a modification of the fan, securing increased efficiency; heating by large air volumes at



Plan of Basement (part of flooring removed to show supplementary coils.)
Fig. 2.

low temperature, rather than by small volumes of superheated air; method of controlling temperature of coils and steam-supply; putting the control of the temperature of every room under the direct control of the engineer; method of determining rate of condensation, and daily aggregate condensation, as a means of critical study, and as a means of determining the cost of the heating and ventilation.

The building measures about 90′ x 350′, 75′ high, and contains some 40 rooms, from 3,000 to 60,000 cubic feet in capacity. In determining the requisite air-supply for each, regard was had to the maximum number of occupants, and the character of their work, the cubic capacity being considered only with regard to the distribution of the air. There are five grades of air-supply; ordinary lecture-rooms receive 1,500 cubic feet per hour for each person; physical laboratories, where some gas-flames are used, 2,000; ordinary chemical laboratories (effective hoods being assumed), 3,000; the organic chemical laboratory, 4,500; and libraries, balance-rooms, etc., receive 2,000. The total capacity of the rooms is about 741,000 cubic feet, independent of halls, stairways, etc., and the mean total air-supply about 3,535,000 cubic feet per hour, corresponding with a uniform distribution, to a change of the entire air every twelve minutes. In the

[2] From the *Proceedings* of the Society of Arts (Boston).

chemical laboratories, however, the air is changed every six or seven minutes.

The general arrangement of walls, piers and flues is shown in Figure 2 and Figure 3. The piers, two feet square, run from the stone foundation to the top of the building, and the flues are formed by the shell walls between these piers. There are 79 flues, about 1′ x 3′, with a total area of about 230 square feet. Only 120 square feet being actually required, it will be seen that there is an abundance of flue area. The arrangement of the flues is as follows:

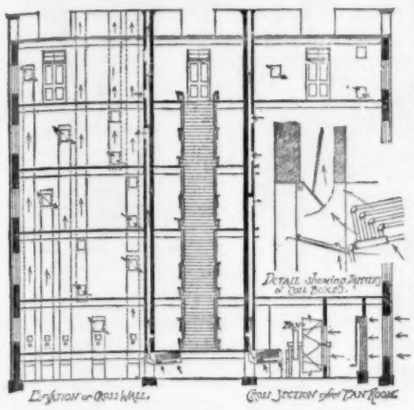


Fig. 3.

In transverse walls;	14	entire, and	2	partial flues;		
In longitudinal	" 19	"	" 12	"	"	
In outside	" 28	"	" 4	"	"	

nearly one-half of the entire flues being in the outside walls. Forty-two per cent of the entire air had to be thrown north of the transverse wall (Fig. 2), and as there were only fourteen entire inside flues to do it, all of the outside flues in this part of the building, with one exception, had to be utilized for heating, notwithstanding the objections to such use, viz., that such an arrangement is wasteful of heat, the currents sluggish, that there is often a downward current due to diminished pressure on the lee side of a house, and (most important of all) that they interfere with the complete movement of the air in the rooms.

The conditions essential to good ventilation are that a current of fresh air should move through the room in such a way as to move the whole body of air in the room without mixing the fresh air with the foul, without producing a sensible draught, yet in such quantity as to meet the largest requirements.

These conditions are best fulfilled by placing the inlet above the outlet, and on the warm side. The incoming warm air then rises, traverses the room to the cold outer wall, where it is cooled, and, after falling, moves along the floor to the outlet. Draught is avoided by placing the inlet above the heads of occupants, though at times, when the incoming air is cooler than the air of the room, a draught is felt. Mr. Woodbridge had proposed avoiding this by having the entire inlet flue open up to the ceiling, and covered with a wire gauze painted the color of the wall.

In the original plan a fan was proposed for use as required, but for outside temperatures below 30° Fahrenheit, the flue-space provided was ample without it for the requirements of the various rooms, provided the flues were kept free, and that for their full supply the movement of the air toward them should nowhere be of greater velocity than in the most sluggish of the flues. This plan was defeated by a stricture of the flues at the bottom, and by a change in the position of the fan, which diminished the inlet area considerably.

The finish of the flues is rough brick, smoothed and finished with a trowel and whitewash-brush. Each inlet-flue connects with but a single room, but in some cases the outlet-flues from different rooms are connected.

Three dampers are placed in the outlet flue: one at the top, to keep the flues warm and prevent the escape of warm air from the building at night; a check valve at the bottom, to prevent a reversal of the draught; and one at the top outlet of the room, to be opened in warm weather. The incoming air enters the room at about the middle of its height, while outlets are arranged at top and bottom, the former for use only in hot weather, when the incoming air may be cooler than the air of the room. The inlet flues also have three dampers: the register at the inlet of the room (seldom used); a valve at the bottom, used for enlarging the passage to the flue; and a regulating damper, to govern the volume of air entering the flue. This latter damper is used to shut off air from rooms where it is not wanted, and in short to regulate the amount of air passing to the different rooms. Figure 3, which represents a cross section of the building, shows at one side a detail of the bottom of the flue, showing the swinging damper and the sliding-valve beneath.

In each valve there is an anemometer and a thermometer. The flues all terminate in a sub-basement four feet high, extending under the entire building. The shell walls stop at the basement floor, while the piers run to the stone foundation.

The floor is of concrete, each section sloping to a cesspool, so as to be capable of being washed off with a hose, the water being pumped out of these cesspools. The air enters the basement through enlarged windows, with an area of one hundred square feet, passing next through a stack of steam coils with an open area of about one hundred and twenty square feet, and then through the fan into a room forming part of the sub-basement, but extending up through the next floor above, being open on three sides to the sub-basement.

Figure 2 and Figure 3 show the general arrangement, and need no explanation. Figure 4 is a parted section of one of the walls, showing how the flues are carried up and their lower parts used for inlets, while their upper parts are outlets. The circles represent inlets to the various rooms, and the rectangles outlets.

The fan is of the blower type, twelve feet in diameter, and with twelve floats, four feet broad at the back and two feet at the front. A spider and a set of twelve arms at the back of the fan carry the floats, leaving the mouth entirely free. The floats are braced to the arms, and a cone is attached to the back of the fan, with its apex toward the mouth, to facilitate the change of direction of the current. The peculiar features of the fan are its large mouth, nine feet in diameter, and the fact that it is not housed, but has a free delivery over its entire circumference. The power required to drive it is very small. When delivering 85,000 cubic feet per minute, and at an outside temperature of 60°, at which temperature all the load was on the fan, the indicated power was only 14 H. P.

Fig. 4.

The air is taken from the lawn side of the building, where the earth is clean and there is no decayed matter.

In regard to the heating, it was expected from the beginning that the cost of heating and the expense of operation would be very much greater for the new building than for the old, on account of the greater loss of heat due to thinner walls, greater window area, etc. A calculation showed that for temperatures inside and outside of 65° and 10° Fahrenheit, the loss would be over twice as great in the new building as in the old.

Moreover, the amount of air to be heated in the new building was to be twice as great as that indicated by calculation for the old; hence it had been estimated that as the old building alone had required 275 tons of coal yearly, the new building would require from 500 to 600 tons. The same amount of pipe was required as in the old building, for although twice as much heat was to be used in the new, yet the velocity of the air through the coils was greater; hence the steam would be condensed faster, and about the same area of pipe would answer. Such was found to be the case.

The whole matter of heating was put into the hands of Mr. F. Tudor, and most of the system was of his devising. The air is first heated by the main coils, and passed into the sub-basement heated to 50° or 60° Fahrenheit. This was done, instead of depending on small coils for each flue, for the sake of economy in concentrating the coils, and moreover, in order to have the basement warm, and to protect the water-pipes. On the other hand, the main coils heat the air *only* to 50° or 60°, because that is the mean temperature of the soil, and any greater heat would involve a loss in warming the soil and in evaporating its moisture.

The supplementary coils over which the air passes before entering the flues are located in the sub-basement, for economy of arrangement, to avoid the cutting of floors and walls, to obviate any danger of leakage and consequent staining of walls, and in order to place their manipulation entirely in the hands of the engineer.

The main coil is twelve feet high by twenty-two feet broad, and is in eleven sections, one of which contains only condensed water. It has one hundred and twenty square feet of opening. Its temperature is regulated by varying the pressure on the entire coil, or, when the outer temperature is above 32° Fahrenheit, by shutting off certain sections. Two doors may also be opened above, allowing the air to pass around the coil if necessary. The coil was placed in front of the fan in order to secure a large air-space beyond the fan, and that the heated air might be thoroughly mixed in passing through the fan. On the other hand, the arrangement involves a greater loss by radiation.

There is a supplementary coil at the foot of each flue, seventy-six in all, distributed along seven hundred feet of wall, and over a floor area of twelve thousand square feet. The area through the coil was intended to equal the total flue area. Pipes are used in making them up, so as not to contract the air space, instead of pin or Gill radiators. With them the air may be heated up to 110° Fahrenheit, if necessary. Their arrangement within the limited room available was very difficult, the steam main being below the boiler level, and the return below the tank for condensed water. It was also desirable to control the temperature of each coil by a single valve and to prevent steam pressure in the return, so that steam could not back up into coils which are not used or only partially used. To meet these difficulties, Mr. Tudor's fractional valve[1] was applied.

The theory of the valve action, as applied to this system, is based on the fact that a given coil surface will in a given air temperature and current condense a fixed amount of steam at atmospheric pressure. With a fixed position of this valve, and a fixed steam pressure, each coil will be just filled with steam and no more, none escaping at the open lower end, the rate of supply being just equal to the rate of condensation. In this sub-basement we have very constant conditions, the temperature being never above 60° Fahrenheit, the velocity of the air very constant, while the steam pressure is made constant by reducing valves, and cannot exceed ten pounds.

All the coils drain into an open pipe leading to a tank. The boilers and engines supplying steam and power are all in the old building,

[1] For description of this valve see *The Sanitary Engineer*, November 29, 1883, p. 616.

some one hundred and fifty feet away. The shallowness of the basement renders it necessary to run the valve-stem through the floor (Fig. 1).

Two boilers, of from sixty to eighty horse-power, furnish steam to the new building; but as they do other work also, the measurement of the coal burned under them does not show what is necessary to heat and ventilate the new building. To do this, the best way is to measure the water of condensation. A water-meter was first suggested, but trouble was anticipated on account of the water being hot. It was finally decided to pump the water from the tank into which all the returns lead by a Davidson pump, which serves as a water-meter, the number of strokes being measured. One of Mr. Tudor's employés, Mr. Kenway, had suggested an automatic recording device, giving the rate as well as the aggregate amount of condensation. The arrangement of this apparatus is shown in Figure 1. A cylinder, around which a sheet of paper is wound, is revolved by a twenty-four-hour clock, and a pencil is moved along this cylinder by the strokes of the pump, thus giving a very sensitive automatic record. Indeed, the curve traced (see Fig. 5) shows not only the time of letting the steam on and off, the time of starting the fan and of opening the cold-air windows, but also shows plainly the effect of a change of outside temperature during the day, and the sudden condensation in the cold pipes when steam is first admitted. This is shown by the rounding of the curve in the diagrams, about 6 or 7 a.m. Its most important office, however, is to give the quantity of condensed water, from which the necessary amount of coal may be calculated. By means of this apparatus, the amount of coal required for the new building has been studied and some very interesting results arrived at.

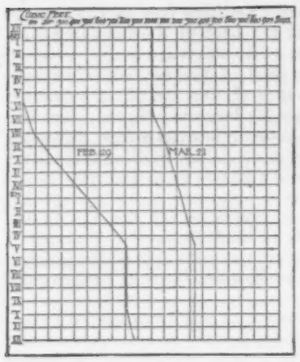


Fig. 5.

Referring to Figure 6, if we represent by horizontal distances the number of degrees the outside temperature is below that required, and by ordinates the number of degrees the outside air must be heated, we shall obtain a line (dotted) running at an angle of 45°. Thus with a required temperature of 65°, and the outside air at 30°, we have the vertical distance to the dotted line at 30, giving the number of degrees the outer air is to be heated, represented by 35. This would be exactly true were it not for losses through walls, windows, etc. Calculation from observed data shows that, whereas, were there no losses, the outer air would have to be heated 35°, the actual effect of the losses will be that the air must be heated half as much again, or 52.5°, to maintain the desired temperature. The upper line on the diagram is therefore plotted with its ordinates $\frac{3}{2}$ of those of the 45° line. In this diagram it happens accidentally that the quantity of air required is such that to heat it one degree requires one cubic foot of water per hour; hence the ordinates to the upper line represent cubic feet of water per hour, corresponding to the outside temperatures on the horizontal line. The circles enclose points plotted from recorded observations, and their agreement with the theoretical line is very close. The few cases of divergence have been satisfactorily explained by local circumstances. This shows the application of the apparatus described to the study of the cost of the heating and ventilation.

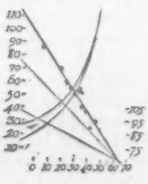


Fig. 6.

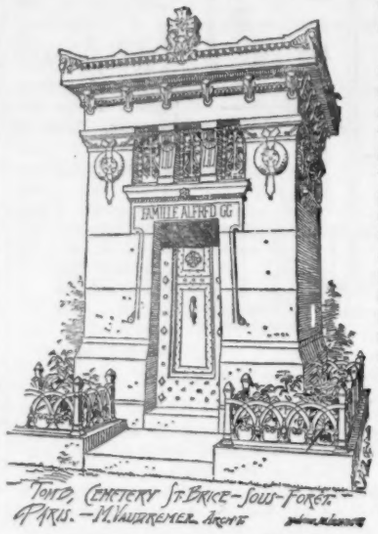
Taking the average temperatures outside and inside as 34° and 65°, Mr. Woodbridge had estimated that for six months (November to April) 373 tons of coal would be required for the new building. Experience had shown that about 275 tons would be needed for the old building, and it was estimated that 108 tons would be used for power and other work than heating, making 756 tons in all. The actual consumption was 950 tons, leaving 194 tons unaccounted for. The source of this loss will be studied into by means of the apparatus which has been explained, and it is hoped it may be discovered.

The actual results of the system are fully as satisfactory as were anticipated, and all difficulties which have appeared have been easy to remedy, with one exception, viz., as the heat is all indirect, and with air at a low temperature, there is not that accumulation of heat in the air and walls and ceiling that is found in rooms warmed by highly-heated air; and as soon as the steam is shut off the rooms are quickly chilled. This tendency is increased by the large window surface and the inevitable escape of warm air from the top stories of the building, and the corresponding indraft of cold air from the lower stories, especially at night, when the basement windows are closed.

In regard to moisture, Mr. Woodbridge thought a relative humidity of forty per cent at a temperature of 65° was sufficient, it being much easier to keep the air sweet when the relative humidity is low. Regarding the chemical composition of the air, Professor Nichols has found for Room 35 (capacity 27,000 cubic feet), after eighty or ninety students had occupied it for an hour, the following results; February 29, 4.3 parts carbonic acid in 10,000; March 5, 6.1, and March 11, 4.5 parts; and in room 38 (capacity 17,000 cubic feet), after thirty students had occupied it for three hours, 5.5 parts, or practically no contamination.

As a whole, the work is highly satisfactory, not because perfect, but because in so many respects it meets the wants it undertook to satisfy.

WORK AND WAGES.



THE naming of a day early in the spring of 1886 for a convention of representatives of all the labor organizations in the country, whereat steps shall be taken to make the legal working-day in every part of the country no more and no less than eight hours makes it very desirable to expose the fallacy of the "eight-hour movement." As we have never seen it put in a more simple and understandable form than has lately been employed by the Boston *Herald*, we reproduce its arguments at length: —

WILTON, ME.
September 29, 1884.

TO THE EDITOR OF THE HERALD, —

In conversation recently with a gentleman from New York, a contractor and builder, and an ardent disciple of B. F. Butler, he advocated the passage of a law making eight hours constitute a day's work. He urged that its adoption would be immediately followed by a rise in wages, because it would create a demand for twenty per cent more labor.

Now, I am confident this reasoning is incorrect, but I am unable to demonstrate its fallacy to my entire satisfaction, so I appeal to you to set me right.

If it will not trespass too largely upon your time and space, an answer through the columns of the *Herald* will greatly oblige,

F. A. R.

The fallacy conveyed in the above assumption is a common one, and runs through all legislation in this country on industrial subjects. Thus, if the assumption were correct that a rigidly applied eight-hour law would be immediately followed by a rise in wages, on account of the demand for twenty per cent more labor, then if work were restricted to two hours per day, there would be a still greater increase in wages on account of the demand for eighty per cent more labor, that is to say, the less time a laborer worked, the more money he would receive, and hence, with two hours toil out of the twenty-four, he would make very much more money than he now does by the steady strain of ten hours per day. This is a delightful theory, and for the good of humanity it is a great pity that in its practical execution certain obstacles are met with which seriously militate against its efficacy. If it were possible of application, the entire problem of procuring for human beings in this world a happy and contented existence would be at once solved. With plenty of time for study and recreation, even the commonest workingman could be both a student and gentleman of leisure, while the scale of pay would be so high as to place every one far beyond the possibility of want. But, as we have said above, there are one or two slight obstacles in the way. If under an eight-hour law but four-fifths, or under a two-hour law but one-fifth, of the wealth is produced that is now the result of ten hours' labor, then necessarily there would be only four-fifths, or one-fifth, of the amount to divide among the workers and the capitalists. As a man cannot by taking thought add one cubit to his stature, so the people of a country cannot by legislation produce any more wealth than their daily work enables them to produce. Wages are paid from the wealth which labor produces, and if this production is restricted then there must of necessity be a corresponding shrinkage in the rate of wages paid. If men could turn out as much in eight hours as they can in ten, then the rate of wages might be the same in either case; but not unless the results of work corresponded. To give a broad example: — According to the census of 1880, there was produced that year in the United States wealth approximately amounting to $7,500,000,000. Of this, fully $6,500,000,000 worth of wealth, or $130 per individual, was used up during the year in supporting the life of the community, leaving a margin of saved or reserved wealth of not quite $1,000,000,000. Now, if the work of the entire community had been cut down twenty per cent in amount, we should have produced in the year $1,500,000,000 less of wealth. If we had continued our consumption at the same rate, not only should we have laid nothing aside, but we should have begun the year 1881 $500,000,000 worse off in wealth than we were when we began the previous year. On the other hand, if the united work of the community had produced wealth to the amount of $15,000,000,000, then there would have been very much more to divide among all classes of the community. The consumption of wealth would have

The American Architect and Building News

ADVERTISERS' TRADE SUPPLEMENT.

No. 29. SATURDAY, NOVEMBER 1, 1884. Volume XVI. No. 462.

THE LOW ART TILE.

It is rather hard to have to class the catalogue of the Low Art Tiles with other trade-catalogues, and not to treat it, as in many respects it deserves to be, as a work of considerable intrinsic worth as a work of art. But as the reason of its being is nothing more nor less than to promote the pecuniary interests of the manufacturers of these well-known and attractive tiles, it must be placed in the same category as the common run of trade literature which is struck off at the cost of a few dollars per thousand copies: in the same category, but still at the very top of the list, and with a long gap between it and the next best thing.

We have seen many large and expensive catalogues on whose preparation $25,000 and more had been expended, but never one in which the result of the effort gave adequate excuse for the expenditure. It is asserted that this is the most costly catalogue ever published, and having some personal knowledge of the cost of reproduction by the Heliotype process, we can easily conceive that the assertion can be supported by the receipted bills which the manufacturers can show as part of the return for the expense they have incurred.

The tiles themselves are now too well-known to need description; their reputation is world-wide, and they are gaining in favor daily both at home and abroad; and, thanks to the energy of the manufacturers, agencies have been established in all parts of the country, so that it is comparatively easy for any one to see with his own eyes how much beauty can be added to the furnishings of his house by the appropriate employment of more or less of these tiles, the great beauty and chief merit of which is that they are not aggressive, but are quiet and restful, both in design and color; and being for the most part based on a fairly strict interpretation of natural forms have more of suggestiveness and less of monotony than any tiles that we know.

As a publication this catalogue is a book that any architect would gladly give house-room to, and since it is a trade-catalogue we presume that, in spite of its cost, it was intended for a more or less gratuitous distribution; so we advise any architect who has not already received a copy of it to attempt to secure one, even if he can only do so by paying a nominal price for it. And we feel that it is ten chances to one that in the next specification he draws a call for more or less of these tiles will be made.

But the book is attractive no less because of its score or more of heliotypes exhibiting single tiles, fireplace-facings, hearths, and entire mantel-pieces, than because of the character and merit of the advertisements of other associated industries that fill up the last dozen or so pages. There is hardly one of these "cards" which is not a very masterpiece of ingenuity and effective design, on which thought and care have been lavished as unsparingly as if they were the chief feature instead of the adjuncts of the undertaking. When it is stated that these cards are mainly the work of Messrs. G. R. Halm and C. W. Reed the reason for our commendation will be apparent. Perhaps the most effective one of the lot is that designed by Mr. Halm for F. P. Holmes's inlaid floors.

Certainly if the successful completion of a difficult undertaking is any compensation for the effort, a large measure of gratification must have already fallen to the share of the manufacturers,

Messrs. J. G. & J. F. Low,
Chelsea, Mass.

Public-Hall Chair, made by the Harwood Manufacturing Co.

AMERICAN SOAPSTONE FINISH CO.

Soapstone Finish of a pearl-gray color, pleasant to the eye, doing away with the glaring white of ordinary hard-finish, is well-known to many readers of the *American Architect*. Its introduction commenced about four years ago, and now that its merits are becoming known, it is being used extensively. It possesses many advantages over the ordinary plaster or sand finish. It is a non-absorbent and non-conductor; is virtually a fireproof material; does not chip-crack; improves in color and brightness with age; can be washed without injury, and therefore does away with the necessity of painting or kalsomining, while its cost compares favorably with other kinds of finish. Soapstone Finish is now being used in various parts of the United States, and many representative buildings can be referred to.

The American Soapstone Finish Company, manufacturers and owners of the patents, are furnishing the material in various colors mixed ready for use, and can refer to first-class buildings which are admired for the beauty and cheapness of the interior finish with this material.

Potter's Colored Mortar Material is a reliable article for use in laying front brick. It will not wash out, fade, or stain the brickwork. Can be had in red, black, buff, or gray. It makes a strong bond, and is especially recommended for laying chimney-tops and fireplaces, as the heat or gases will not affect the joint.

The Potter Blackboard Material is put-up in packages of different sizes, ready for application by the plasterer to the walls of school buildings, and is pronounced by educators as making the most perfect marking surface. Its durability and cheapness command for it the general use it is having in new school buildings.

Exhibits of the above-mentioned materials can now be seen at the New England Fair, Boston, and the American Institute Fair, New York. At the latter place the finish is shown on the walls and ceilings, in various tints as well as plain, and a fireplace in brickwork, showing the different colors of mortar. It will be of interest to architects, builders, plasterers, and others to visit one of these places.

American Soapstone Finish Co.,
Providence, R. I.

PUBLIC-HALL CHAIRS.

We show above a cut of one of our new pattern chairs for public halls.

The chair is made in sets of three or four, and so arranged that the rear legs can be folded (by means of a joint in them) against the front legs. (Patent applied for). The seats turn up like any opera-chair, and have hat-holders beneath. They are made noiseless by rubber buffers. When folded, the chairs are only six inches thick, and can be readily packed away when it is desired to clear the house. It is now considered indispensable in seating halls which have movable

seats to have chairs with folding legs, light and strong; while the addition of separate lifting seats gives the chairs all the desirable features of fixed opera-chairs.

The Harwood Company have given special attention to this kind of seating for public halls, and have a variety of patterns, all with the folding legs and separate lifting seats.

The chair shown, No. 27, recommends itself by its easy shape and symmetrical style. It is nicely finished in light or mahoganized birch, and is covered with the patent fibre seat and back, leather finish, which is especially adapted to public seating, and is much used for the purpose in all kinds of chairs. In this way a chair is produced which is as handsome as a leather covered chair, at vastly less expense. In durability it is equal to the real leather.

We make a great variety of permanent opera-chairs, both with wood and iron frames, and seated with any kind of upholstering which is ordered.

Wooden frames are now preferred to iron, as they are more reliable, are susceptible of a nicer finish, and are not so cold and forbidding as an iron chair.

HARWOOD MANUFACTURING CO.,
91 Summer St., Boston, Mass.

CORRUGATED-IRON ROOFING.

In connection with the completion of the new building for the Fair and Exhibition of the Pennsylvania State Agricultural Society, the *Philadelphia Times*, of August 24, says: —

At the request of contractor Doyle, Judge Watson formally made over the grounds and buildings to the committee for the society. In describing the work done, the Judge said: —

"The first work accomplished was the fencing. This is over a mile, accurately 5,780 feet, and 8 feet high.

"Inside the fence are nine cattle sheds, each 130 feet long by 24 feet wide, with 261 stalls, capable of accommodating about 600 head of cattle.

"The sheds for sheep are of the same dimensions, with 130 pens, and there are three similar sheds for swine, with 125 pens.

"A large building for horse stabling was next erected, 1,500 feet long by 12 feet wide, divided into 125 box stalls, each 12 feet square.

"A poultry-house, 150′ x 50′.

"A seed-house 200′ x 60′, and a floral-house, 100′ x 60′, were next finished.

"Next came a 'house of comfort,' 100′ x 60′, and then the builders went to work on the main building, a structure 300′ x 150′, 75 feet high, with a truss in the centre 75 feet in span, and two side trusses 37 feet 6 inches in span, each.

"The restaurant is 100 feet long by 60 feet wide.

"There are also five sheds for machinery, each 50′ x 30′, and an octagon music stand, 20 feet in diameter.

"The roofs are of corrugated-iron, manufactured by the Cincinnati Corrugating Company, of Cincinnati O., in all amounting to 210,000 feet of iron.

"In the building of the various houses and sheds 1,200,000 feet of lumber has been used, and the whole place has been completed by Mr. Doyle, with an average of 75 men a day, in the incredibly short space of 73 days."

In addition to the above compliment, we have received the following letter: —

Bristol Post-Office, Pa., August 28, 1884.

Cincinnati Corrugating Company: —

Gentlemen, — I am one of the five members of the Executive Committee of the Pennsylvania State Agricultural Society who decided upon the adoption of your Corrugated-Iron Roofing for our new buildings erected by Mr. Doyle.

I am much pleased with the material, and believe I could use it extensively upon our buildings here, and on other farms. With this idea in view we write for the following information, etc. . . . Very respectfully,

Burnet Landreth.

We respectfully invite your attention to the above circular.

THE CINCINNATI CORRUGATING CO.

ASBESTOS AND ITS USES.

This mineral has, through the efforts of manufacturers, become one of the leading specialties of the business of this country.

Sixteen years ago it was, to all intents and purposes, unknown.

The incombustibility of asbestos is its principal characteristic, and manufacturers and inventors are turning their attention to its uses in the production of fabrics to be used solely for their fire-proof qualities. It is capable of receiving and retaining the most brilliant colors, is a non-conductor of heat and electricity, and possesses many other valuable and practical qualities.

In 1868, Mr. H. W. Johns first made known the results of his experiments with the mineral, and having proved its value in the manufacture of materials for mechanical purposes, the company of which he is president is now producing them on a large and extensive scale.

Among the most important products are rope and wick packing, for packing pistons, stuffing-boxes, valve-stems, etc., flat packing or mill-board for cylinder-heads, flange-joints and similar purposes, sheathing and building felts, all of strictly pure asbestos.

The asbestos and India-rubber sheeting, tape and gaskets for hot-water and steam joints, are comparatively new articles of manufacture; also asbestos-cloth of various widths, thicknesses and weights, and asbestos thread, yarn and twine.

The asbestos roofing manufactured by this company is well and favorably known, and its reputation fully established. As a light, portable, easily applied, practically fire-proof roofing, it has no superior. Of this article the company are manufacturing from *two to three miles per day*, and find a ready sale for it.

In 1874, Mr. Johns commenced the manufacture of liquid paints on a more extended scale. These paints are composed exclusively of the best and purest materials, combined on different principles from any other liquid or mixed paints. The purest linseed oil and the best pigments enter into their composition.

To assist consumers in selecting shades and colors for the satisfactory decoration of their buildings, the company issue and send free, upon application, sample sheets showing forty-eight standard colors and tints; they also issue a pamphlet on "structural decorations," giving hints and suggestions in painting and decorating, in which they bring the different colors together — body, trimming and blinds — so that it is an easy matter for the consumer to decide what colors will best please him.

In addition, the company also manufacture roof, car and bridge paints in seven colors.

Recently the company have begun the manufacture of strictly pure colors in oil, and are meeting with a ready demand for their goods.

H. W. JOHNS M'F'G CO.,
87 Maiden Lane, New York.

NEW YORK WOOD TURNING CO.,
134th Street, near 3d Avenue.
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SQUARE-TURNED BALUSTERS,
NEWELS, TABLE-LEGS, Etc.
Hard-Wood Mouldings & Wainscoatings.
PATENT CORNER BLOCKS,
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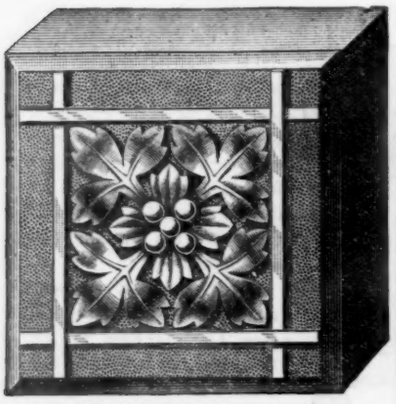

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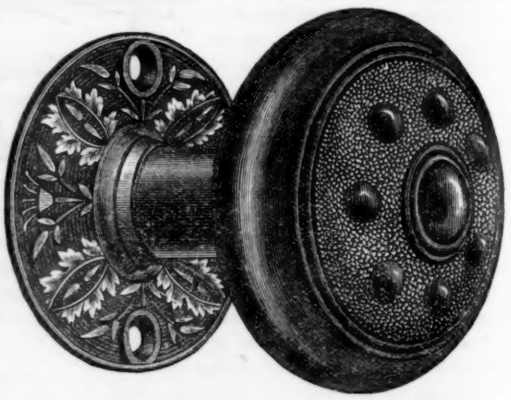

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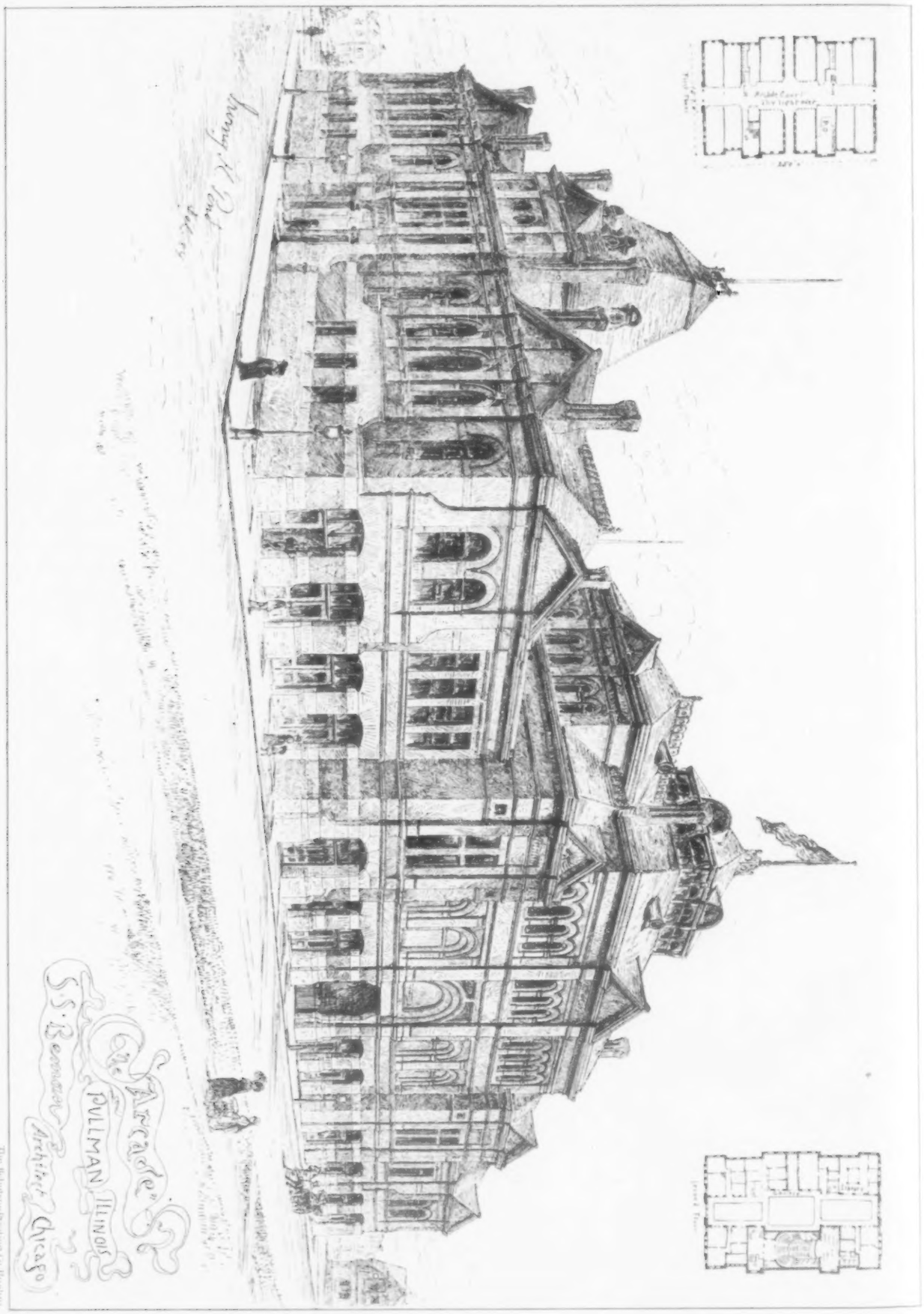


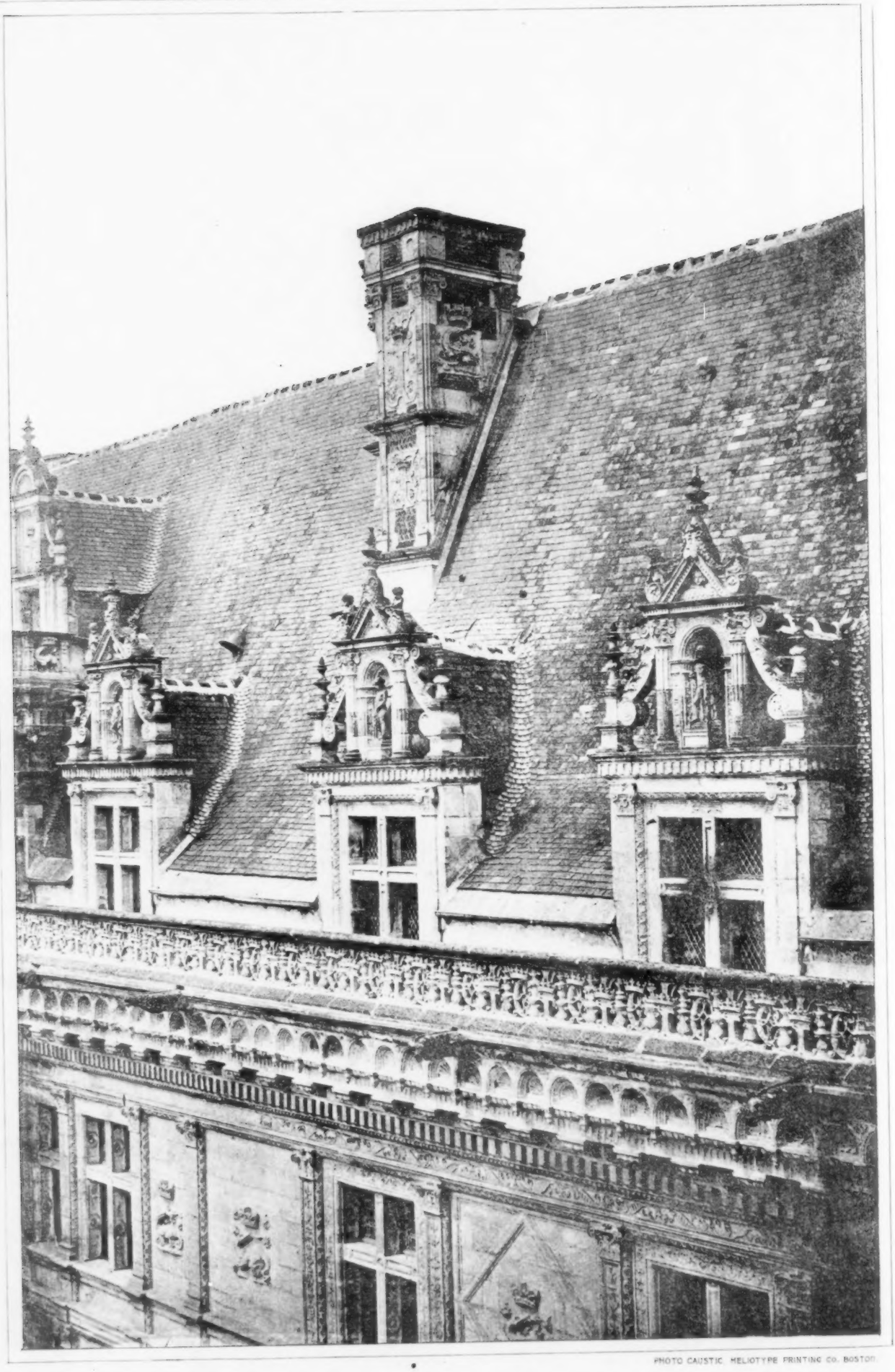
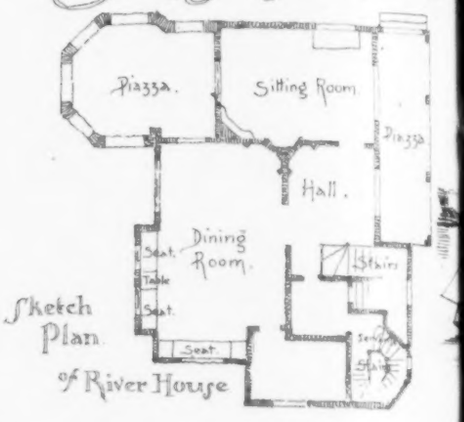


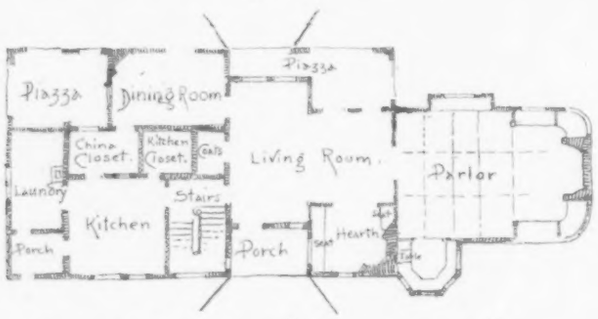
PHOTO CAUSTIC. HELIOTYPE PRINTING CO. BOSTON.

CHATEAU DE BLOIS, FRANCE.

Pencil-Sketche

The River House





Sketch-Plan of the "Barn-House".

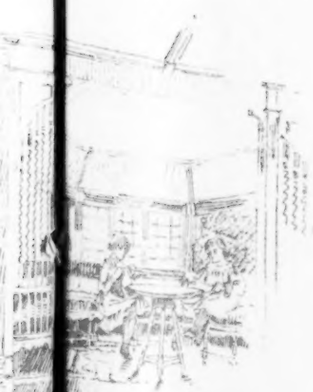
The Barn House

at Manchester by the Sea: Mass: by E. Eldon Deane:
The River and The Barn House of Mr. Arthur Little Archt. Boston:

The Distant View of the River House.

Back Gable & Octagon Turret of the River House.

Hall Fireplace River House E.E.D.



E.E.D. Bay Window of Parlor. Barn House.

E.E.D. The Barn House Hall & recessed Fireplace - with peep into Parlor.

The Heliotype Printing Co Boston

PHOTO CAUSTIC HELIOTYPE PRINTING CO. BOSTON

Town Hall at Louvain, Belgium.

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Wainscoting in the Library
Ceiling of Proscenium Jones
Proscenium Boxes Arcade Theatre
In the Library
Stairways to Balcony Arcade Theatre
From the "Arcade" at Pullman, Illinois
S. S. Beman, Architect, Chicago

The Bolenius-Detwiler Co. Rochester

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The Decorator and Furnisher.

The new illustrated practical art magazine of 40 pages (Harper's Weekly size) treating of the

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With Practical Directions and Hints and Suggestions and Original Designs for all manner of Home Architecture embracing,

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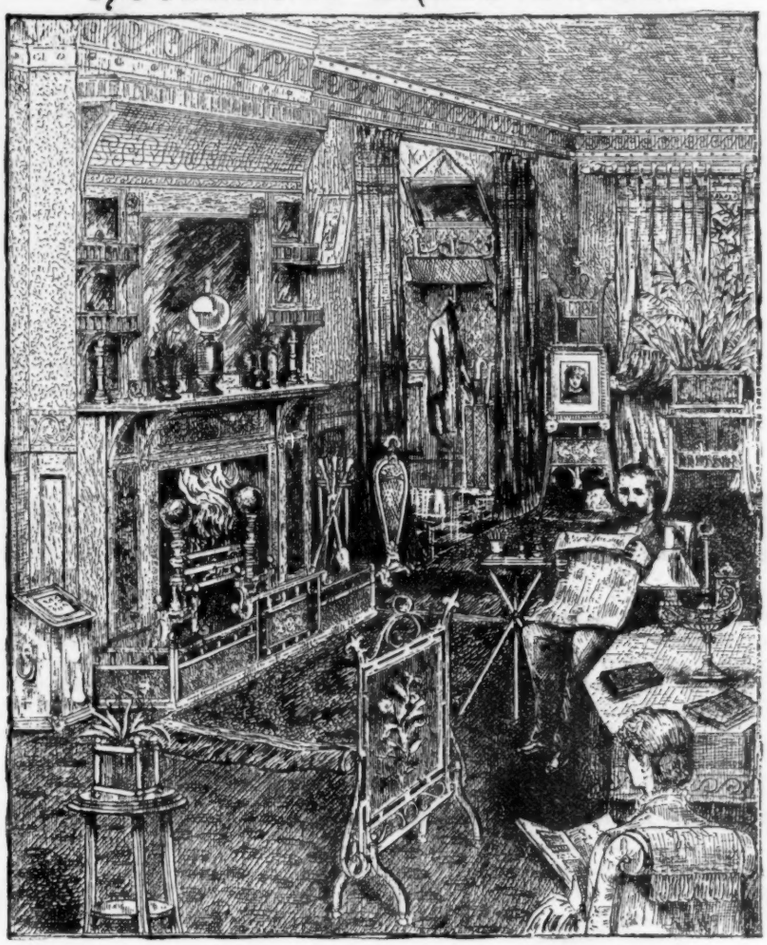

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Fenders, Fire Sets, Andirons, Fire Place Frames, Coal Hods, Grate Trimmings, Screens, Parlor Easels, Banner Stands, etc.

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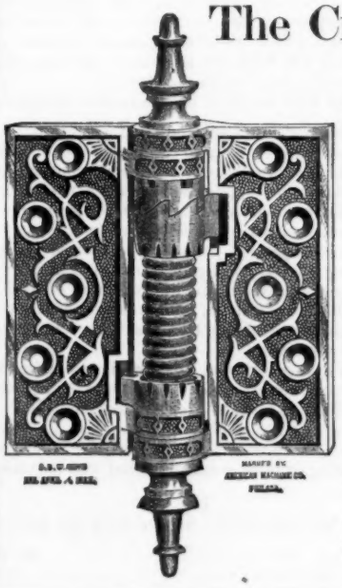

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C. B. Clark's Latest Improvements, Patented April 4, 1882.

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These Hinges have loose pins, are simpler in construction, less liable to get out of order, and the tension of Spring is more easily put on or released than in any other Spring Hinges in the market and without the use of any special tools. There are no loose pieces to the Hinge to be lost or mislaid. All joints are milled, the pins turned and pin holes drilled.

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SINGLE ACTION.	*Jap'd.*	*Jap'd with Nick. Tips.*	*Nickel Plated.*
4x4 for doors 1 -1½ in thick, per pair,	$1.50	$2.50	$3.00
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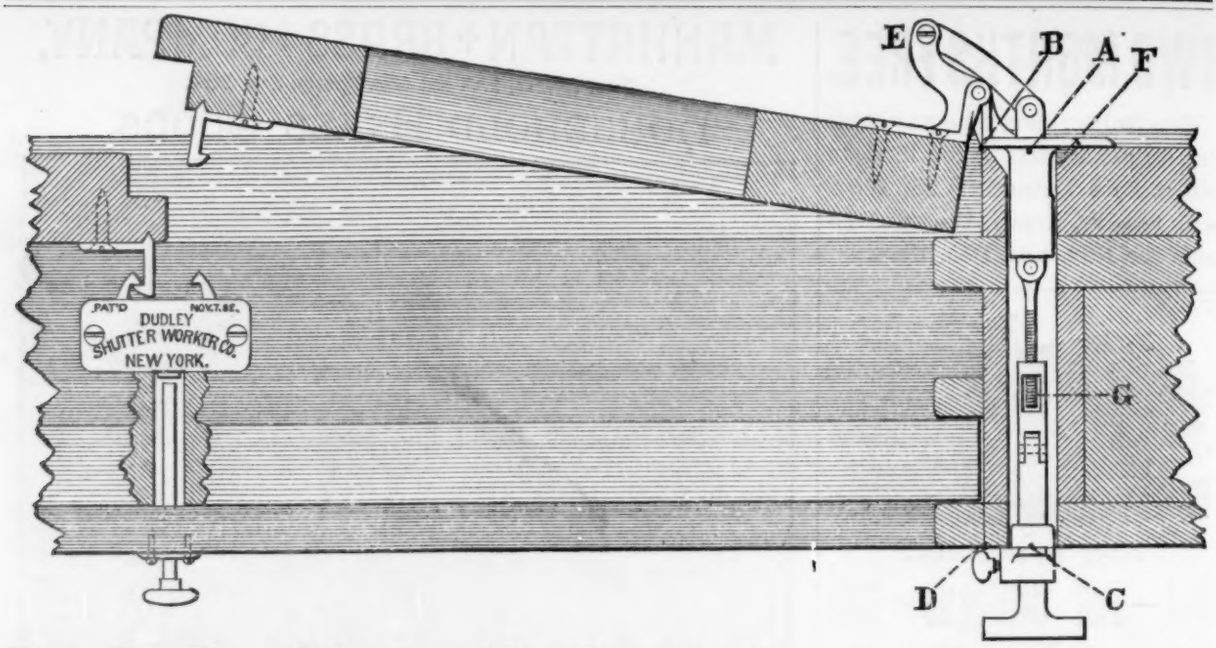

The Dudley Shutter-Worker & Burglar-Proof Lock.

The attention of architects, builders, and house owners is called to the only practical fixture for opening and closing outside-blinds, from within the house, without raising the windows or removing window-screens. With each set of fixtures is furnished all the iron-ware necessary for hanging a pair of blinds. The hinges are the strongest and most durable of any in the market, they and all other parts of the fixture are made of maleable-iron and subjected to a process which renders them rust-proof. They can be applied to blinds already hung, as well as to new work.

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THE DUDLEY SHUTTER-WORKER AND BURGLAR-ALARM COMPANY,

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Something New for the Stable.

Read's Patent Harness Bracket.

An Article long wanted but never before made.

Holds the whole harness, takes no more room than the ordinary hook or peg, can be used for both single and double harness. Gives the harness-case a neat appearance, as it carries the harness up uniformly in width with the saddle, beside keeping the bridle and breastplate in their proper shape. They are neatly japanned, with gilt facings. Price **$18** per dozen. Are now in use in over 100 first-class private stables in and about Boston.

Each bracket lettered **"J. J. Read, Boston, Mass."** For sale by dealers everywhere.

Indorsed and approved by the following named gentlemen, all of whom have them in use:

Boston: R. H. White, J. M. Sears, J. T. Morse, Jr., Thos. Motley. Cambridge: F. A. Kennedy. Portsmouth, N. H.: Hon. Frank Jones. Milton: H. P. Kidder, Col. H. S. Russell, J. M. Forbes. Dedham: A. W. Nickerson. Newton: J. C. Potter. Salem: Dr. W. Saunders. Waltham: J. H. Ellison. Readville: C. G. White. Beverly: Dr. Chas. Haddock. Swampscott; C. P. Curtis.

The public are cautioned against all similar brackets, not marked with my stamp, as such brackets are infringements of patents held by me.

Also cedar-top riding-saddle bracket. Price $3.50 each. An whip-rack for English coach and straight whip combined. Price 50 cents each.

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of the first order are published monthly in

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A Handsome Folio devoted to Home Art.

Besides its fully illustrated and critical reviews of passing art events and biographies of artists and decorators, and its valuable departments of "Furniture and Decoration," and "Answers to Correspondents," (full of suggestions), architects will find in the numerous supplement pages motives for all kinds of

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Terms, $4.00 a year. - Single copies, 35 cents.

Specimen copy sent for 25 cents if this journal is named.

MONTAGUE MARKS,

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The Popular Science Monthly.

CONDUCTED BY E. L. & W. J. YOUMANS.

The Popular Science Monthly for 1885 will continue, as heretofore, to supply its readers with the results of the latest investigation and the most valuable thought in the various departments of scientific inquiry.

Leaving the dry and technical details of science, which are of chief concern to specialists, to the journals devoted to them, the Monthly deals with those more general and practical subjects which are of the greatest interest and importance to the public at large. In this work it has achieved a foremost position, and is now the acknowledged organ of progressive scientific ideas in this country.

The wide range of its discussions includes, among other topics: —

The bearing of science upon education.

Questions relating to the prevention of disease and the improvement of sanitary conditions.

Subjects of domestic and social economy, including the introduction of better ways of living, and improved applications in the arts of every kind.

The phenomenon and laws of the larger social organizations, with the new standard of ethics based on scientific principles.

The subjects of personal and household hygiene, medicine, and architecture, as exemplified in the adaptation of public buildings and private houses to the wants of those who use them.

Agriculture and the improvement of food-products.

The study of man, with what appears from time to time in the departments of anthropology and archæology that may throw light upon the development of the race from its primitive conditions.

Whatever of real advance is made in chemistry, geography, astronomy, physiology, psychology, botany, zoölogy, paleontology, geology, or such other department as may have been the field of research, is recorded monthly.

Special attention is also called to the biographies, with portraits, of representative scientific men, in which are recorded their most marked achievements in science, and the general bearing of their work indicated and its value estimated.

Volume XXVI begins with the November number, but subscriptions may begin at any time.

Terms: $5.00 per annum. Single copy, 50c.

D. APPLETON & CO., Publishers,

1, 3, and 5 Bond Street, New York.

been much greater, and yet the surplus revenue left over could have been considerably larger than it was. In short, where there is a large production there is of necessity large wages, where there is small production the wages are correspondingly low. So long as time remains an element in production, the longer that a man works, everything else being equal, the greater will be the amount of wealth he will produce, and the larger the amount of wages that can be paid him. In order that there may be no mistake, we would add that it frequently happens that a man can produce more wealth by the work of ten hours than by the work of twelve, fourteen or sixteen hours per day, for the reason that the strain upon his physical and mental powers by continued application makes it impossible for him to perform careful and effective service during these long periods of time.

In an issue of a later date, the *Herald* recurs to the topic as follows: —

A few days ago we attempted to answer a question, asked by a correspondent, to this effect: —"Would the rigid enforcement of an eight-hour law increase the rate of wages?" Our reply, in substance, was that it would not, and that, unless the same amount of work were done that is now accomplished in ten or more hours per day, the effect would be to reduce the rate of wages. Exception has been taken to this conclusion by certain newspapers that profess to be the special friends of the workingmen. They assert that our reasoning is colored by a desire to uphold the cause of the capitalists, and that we therefore willingly consent to the degradation of the wage-earners. Such assertions are no more correct than it would be to say that Providence was peculiarly favorable to the wealthy inhabitants of Naples in that it permitted the cholera to find the great mass of its victims among the poor and wretched of that city. What we enunciated was a law as inexorable in its workings as any natural law. We would as willingly as any of our critics put an end, if we could, to the old command that man should earn his bread by the sweat of his brow; but thus far neither human thought nor patience has discovered a means of abrogating it. But it is said, you do not say how much wealth goes to the workingmen and how much to the capitalists. Let us put the comparison in this way then: — According to the last census, there were in this country, in round numbers, 15,500,000 workingmen who earned on an average $350 per year, or a round total of $5,300,000,000. Now let us suppose that these all worked one-fifth less time, and that, according to the statement put forth, they then earned one-fifth more than these old wages. According to the census, the gross value of the wealth produced in the census year was less than $7,500,000,000. If one-fifth was subtracted from this it would leave it $6,000,000,000. Now, if one-fifth was added to the wages of the workingmen, it would give them $6,360,000,000, and thus they would get not only all that now goes to the capitalists, but they would not then have sufficient to pay full wages all around. It is sad that this should be so, but the sadness of the situation does not make it any the less inevitable. Because facts run counter to sentiment, no good end can be secured by abusing facts.

It is indeed unfortunate that many of those who are honestly striving to benefit the workingmen do not take into account the limitations under which all reforms must proceed. The social question, if we did but know it, is the great question of the age. He must be blind to the teachings of experience who does not see in the growing strength of Socialism in Europe the first clouds of a storm which will not stop at the Atlantic Ocean. To-day the workingman says: — In what way am I beholden to the capitalists? I get, indeed, by my work, food, clothing, and shelter for myself and my family; but if I were on a lone island or in the wilderness, the same work would bring to me substantially the same results. But if you, Mr. Capitalist, were deprived of my assistance, if you were isolated on a distant island, what would your wealth be worth to you? It is I and my associates who make your easy existence possible. We do everything for you; you do practically nothing for us. It is the feeling conveyed in the above words that is agitating the minds of millions of men in Europe, and that cannot fail later on to agitate millions of minds on this continent; and what is more, a solution, either peaceful or revolutionary, must be found to the problem thus presented. Certainly we cannot continue to go on indefinitely as we have gone, and the sooner the leaders of public opinion realize the perils involved in delay, the easier it will reach a satisfactory adjustment. But as we have said above, nothing can be gained by ignoring the inevitable. The only wealth that can be divided, by any conceivable system, is the wealth which labor creates, and any plan which proposes to do more than this may be set down as visionary, and any man who advocates such a plan is either self-deceived, or is a wilful deceiver of his fellow-men.

THE ILLUSTRATIONS.

THE ARCADE BUILDING, PULLMAN, ILL. MR. S. S. BEMAN, ARCHITECT, CHICAGO, ILL.

THE building might be briefly described as being 250 feet long, and 157 feet wide. Its cost complete was $325,000. Materials, pressed-brick, terra-cotta, and buff Amherst stone. The lower story is trimmed with this stone, disposed in broad masses; the base being six feet high, and quarry faced.

The ground-floor contains all the stores of the town some fifteen in number, each about 60′ x 26′, all fronting on an interior paved thoroughfare or court, well lighted by a skylight 35 feet wide, and 200 feet long. The interior walls on the court are of pressed-brick.

In the second story are the various town offices, and general business offices of the place, besides various small stores. The Public Library, reading-rooms, and general club-rooms, all of which are approached by a gallery running around the entire court; the sides being connected near the centre by bridges. The theatre has sittings for 1000 persons. There are six proscenium-boxes, a large and thoroughly-appointed stage, and five dressing-rooms.

The cost of fitting up the theatre, including decorations, furnishings, scenery, etc., was $42,000.

The third-story portion of the building is used for lodge-rooms of various orders.

THE HOTEL DE VILLE, LOUVAIN, BELGIUM.

THIS building, which has an evident right to be styled "the most elaborately decorated piece of Gothic architecture in existence," was begun by Matthew de Layens in 1448, and finished after fifteen years' labor. In the course of four centuries the elaborate sculptural detail had suffered greatly, and the building was surrendered, in 1842, to M. Goyers, who restored the entire building with the greatest fidelity to the indications of the original work.

DETAIL FROM THE CHATEAU DE BLOIS.

HOUSES AT MANCHESTER-BY-THE-SEA, MASS. MR. ARTHUR LITTLE, ARCHITECT, BOSTON, MASS.

AN ART YEAR-BOOK.[1]

Monument and Aumbrye: Breton Ch: Engd

THE most costly example of co-operative advertising — in disguise, — that we have ever seen, has been issued by the New England Institute, in a form which we cannot describe with exactness, because we cannot fully comprehend its purpose. In the first place it seems to aim at being a *perfect* example of book-making; next, we should guess its object was to exhibit and advertise the various reproductive processes employed in the illustration of books; after this its apparent excuse for being, is that it is a catalogue of some exhibition containing works of art — inferentially the current Exhibition of the New England Institute in Boston; next, it has an air of being a summary, more or less valuable, of various exhibitions of pictures held during the last year; and lastly and overpoweringly a grand glorification and "beslobberation" — to coin a word — of every person or thing which has the fortune to be mentioned within its covers. It strikes us that except in the last particular it does not quite arrive at the pinnacle of perfection that the projectors had in view.

And yet, take it apart, and then consider the sheets as possible components of some other and less pretentious compilation and much will be found worthy of commendation, particularly amongst the illustrations.

As an instance of book-making the work has one merit, and its projectors have had one "happy thought." It was a veritable inspiration to issue the work in a modest cloth-lined paper wrapper, of which the ostensible purpose is to protect the vellum binding of the book itself, but which discharges the more gracious task of concealing this same vellum cover, than which we never saw a more ghastly sacrilege perpetrated in the name of high art. It is merely a minor mistake that one of the things this work was to exhibit was the several kinds and qualities of paper that may be used in fine books. It gives the book a fragmentary air and suggests, more than anything, the back portion of some English magazines, amongst whose advertising pages are bound up all sorts and sizes and colors of trade-circulars. Moreover it gives most acute emphasis to the remark in the Introduction that the chief difficulty in making such a book "is that of bringing heterogeneous material, into cohesive form, unity of effect being a most desirable quality of all well-made books." We take the privilege of remarking here that the only cohesiveness we can discover about the book is due to the binders' stitches. As a matter of book-making, too, we think that, considering the rough, hand-made paper with its rough edges, and the general air of archaism that has been aimed at in the head and tail pieces, title-page, etc., that it is a distinct mistake to have used type of aggressively modern cut. One would have certainly found the old-fashioned "ſ" not amiss, though he has much to be grateful for in that he is spared the offensive use of the much-abused "ye." On the other hand the printing of the brief introductory "History" of the Institute on pages upon which artotypes had previously been printed has an air *tout à fait joli* — it is well to speak of this feature in French, since it is a copy of a well-worn French trick. Another pretty conceit is the adornment of the

[1] *Art Year-Book*, 1884. Prepared and published by the New England Institute, Boston, Mass, U. S. A.

margins of the "Descriptive and Biographic Notes," with pretty little outline sketches after the manner of "re-mark" etchings.

As a scheme to show what the various reproductive processes of illustration are capable of producing, the attempt is more successful, and there are some very excellent examples, as, for instance, Whitney's engraving of Kenyon Cox's drawing of the statue of Robert Richard Randall, by St. Gaudens, which was published a short time ago in the *Century*. But it seems to us that the possibilities in this direction have not been exhausted; even plain lithography and photo-lithography have no representations.

How far it is a satisfactory catalogue of the exhibition of pictures at the Exhibition of the New England Institute we cannot guess, since we have not visited the gallery there; but if the compiler is as inaccurate in his facts as he has been slip-shod in his proof-reading, this part of the text is no unworthy companion for the text of the "Notes." Here it is that our discontent is turned to disgust. One could find excuse for occasional lapses from good-taste, for infrequent inelegancies of expression or sporadic instances of faulty English, and for mistaken punctuation or downright bad spelling, but when we find that twenty pages are taken up with fulsome flattery and gush, ill-expressed, and in imperfect English, when every person or thing mentioned is heralded by laudatory adjectives and superlatives of every degree of intensity one becomes sated with disgust. As but a sample of the style of blundering adulation we will quote a single example, since it concerns an architect, who is, we believe, a most modest and unassuming man, one to whom we will not do the injury of repeating here his name.

"—— —— —— The admirably chaste, and thoughtful initial head-band and tail-piece used to adorn the sub-title-page to Examples of Graphic Processes is by this designer, an architect by profession. Among his notable works may be mentioned the design of the bound volume of the Century Magazine. To a highly original style of work Mr. —— adds the impress of a most refined imagination and skill."

O, most "refined" and skilful designer of "admirably chaste" tail-pieces, does it flatter you to have it proclaimed that your most "notable" work — presumably "thoughtful" too — is a "bound volume" of the *Century?* Have you, too, gone in for the manufacture of *perfect* specimens of book-making? and how does one set about designing a "bound volume?"

For the credit of womankind, we trust that only men were responsible for this mistaken publication — mistaken in conception, in purpose, in execution — and unfortunate beyond expression in being entrusted to the hands that have spent so much money to so little good purpose.

If, as is frequently proclaimed in different parts of the book, the policy of the New England Institute is "generally progressive," we will suggest that it can give no better evidence of its right to be so described, than by making the utmost haste to remove itself from all temptation to repeat next year what it has attempted this.

We note two facts with complacency, the edition is a small one, *and the plates have been destroyed.*

A METHOD OF SINKING THROUGH QUICKSAND BY ARTIFICIAL FREEZING.

Grande Frise du Louvre: Paris

AT the monthly meeting of the South Staffordshire and East Worcestershire Institute of Mining Engineers, held at Dudley, Mr. Henry Johnson, Sr., in the chair, Mr. Herbert W. Hughes, A. R. S. M., read a paper on this subject. He said: Mining engineers are generally interested in the question of traversing very water-bearing ground. It frequently happens that valuable seams are overlain by ground of this kind, and it has to be sunk through before they can be reached. In carrying a sinking through beds of quicksand or loam saturated with water, an enormous pressure develops itself against the timber set to support the sides of the excavation, since the cohesion between the particles of the rock is very small. A necessity for strong timbering therefore arises, but this excessive pressure is not the only difficulty to overcome, when, as in quicksands, the spaces or voids between the particles are filled with water, the cohesion between the grains of sand is destroyed, the film of water surrounding each grain, and the floating action of the fluid present in the interstices preventing friction. Hence it happens that if an opening is given to the fluid, the grains pass out with it, and it then becomes more easy to excavate than to prevent the formation of irregular empty spaces, which would give rise to intense unequally distributed pressures, which are difficult and sometimes impossible to resist. This fluid character of the sand constitutes a very great difficulty in sinking, because the issue of the sand into the excavation occasions the falling in of the sides and surface. When the water among the sand is under great pressure, the difficulty is enormous, and in some cases insurmountable. Thus at a sinking recently undertaken at a Belgian coal field, a quicksand was encountered at a considerable depth from the surface, after passing through the overlying beds without difficulty. As soon as this bed was struck the fluid mass of sand and water rose so rapidly in the shaft that the sinkers had hardly time to escape. After contending with this eruption for a long time without success, the sinking was finally abandoned. Numerous other examples might be given, especially in the North Eastern coal district of England, and in the Ruhr and Mons basins; some were successfully completed, though at enormous cost. Sinking through such strata is the most costly and uncertain among mining operations, and therefore a new method, which has already proved useful in a severe case, is a boon to mining industry, and seems to be applicable in a certain number of special cases.

The result is obtained by artificially freezing the ground in question, and after it is frozen one finds a solid mass, which can easily be cut with the pick, and presents no especial difficulty in its removal. This process, invented by Herr Poetsch, was described in 1883 in the "*Bulletin de l'Union des Ingénieurs des Ecoles de Louvain.*" The author of the note, M. André Dumont, says that the first idea was given some years ago by M. Lambert, in his lectures on mining at Louvain. This might be so, but there is no doubt that the credit of bringing the process into practical use belongs to Herr Poetsch, under whose direction the manner of proceeding has been successively practised in the sinking of the Archibald shaft, near Schneidlinger, in order to work the lignite there. After sinking a little over thirty-seven yards without difficulty, the shaft reached a wet quicksand, which was proved by boring to be eighteen feet thick, the lignite being below this bed. The shaft was a rectangular one, fifteen feet six inches long, and eleven feet six inches wide. Around the circumference of the shaft a series of holes were sunk by means of a sand-pump; being tubed as they go down, and finally one was put down in its centre. There were twenty-three of these pipes of seven-and-three-fourths inches in diameter. When these tubes had penetrated through the quicksand, their lower ends were made water-tight by means of lead stoppers, these latter being covered with several layers of cement and tar poured into the interior. Into the centre of each of these larger pipes a smaller tube of two-and-one-quarter inches diameter was introduced, having its lower end open; and also with side openings pointing towards the bottom. These latter pipes are provided with stop-cocks, and joined to a circular distributing pipe suspended above the bottom of the shaft. Down this a freezing mixture is pumped, and circulates in the annular space between the two tubes; by this means the ground between each pipe, then that within the shaft itself, and also the ground outside the limit of the shaft is frozen hard enough to give it solidity. The freezing mixture used was a concentrated solution of the chlorides of calcium and magnesium, which freezes at a temperature of 45° C. In sinking the Archibald shaft the solution, cooled to a temperature of 25° C., by a manner described farther on, was forced by means of a pump into the pipes of two-and-one-fourth inches diameter, and ascended in the annular space between these pipes and those of seven-and-three-fourths inches diameter, rose to the surface of the quicksand, and was collected in a trough from whence it again returned to the freezing machine at a temperature of 19° C. This low temperature on returning was not expected, and consequently the ground was soon frozen: of course the most intense cold was at the bottom of the pipes. As a result of this, small cones of frozen earth, with their bases downwards, were first formed, the dimensions of which increase progressively; they cross one another and unite, forming ultimately a compact mass, the solidity increasing with the depth.

At the Archibald sinking, a mass of ground twenty-four feet wide, twenty-seven feet long, and eighteen feet thick, was frozen into a solid mass in thirty days. In order to determine how the freezing progressed, pipes containing a solution of chloride of calcium were put into the ground and thermometers immersed in them. In this manner it was possible to estimate the reduction in temperature during twenty-four hours. The total reduction was 30° C., viz.: from an initial temperature of + 11° C. to a final temperature of — 19° C. We may, however, presume with certainty that a lower temperature was reached, because these observations could only be made in the upper part of the quicksand. Horizontal measurements proved that the freezing extended outwards from the pipes for a distance of ten feet. After thirty days the workmen could proceed with the sinking; the mass of frozen sand and water possessed a hardness which allowed it to be easily cut with the pick; its fracture, as may be supposed, was conchoidal. During the sinking of the shaft the workmen were protected from an influx of quicksand by the frozen wall of ice around the dimensions of the shaft, this wall being able to withstand enormous pressure.

The manner of freezing the solution at the Archibald sinking was based on Carri's principle, the necessary machinery to carry it out being designed by Herr Kropf, of Nordhausen. It depends on the property of fluids absorbing a large quantity of heat when passing from the liquid into the gaseous state. The fluid used was liquid ammonia, which boils at 0° C., under a pressure of three-and-a-half atmospheres, and at 20° C., under a pressure of 0.84 atmospheres. That is to say, ammonia, in passing from the liquid into the gaseous state, under a pressure of 0.84 atmospheres, reduces the temperature to 20° C. In a large boiler, placed in a convenient position, an aqueous solution of ammonia is boiled. The gas enters a condenser cooled with water, and is there submitted to a pressure of from ten to twelve atmospheres. At this pressure the gas liquefies, and is then conducted into a reservoir fitted with an indicator showing the height of the fluid in it. From this reservoir the liquid ammonia passes by a pipe into a spiral-shaped tube, where it once more volatilizes, and by so

doing abstracts heat from the mixture of the chlorides of calcium and magnesium which surround the tube. The construction and working of the machine cannot be entered into here. Designs and full description will be found in the before-mentioned memoir by M. Dumont. The principle only is given. Further trials will no doubt confirm the favorable opinion already obtained by this ingenious process.

When Herr Poetsch first introduced this process he recommended the following arrangement of the pipes in the quicksand: Just before reaching the quicksand the shaft should be widened out for a few feet over its proper dimensions. A row of pipes about three feet apart, should then be placed around the shaft, slightly outside its area, another row should be placed inside the area of the shaft, and finally one should be placed in its centre. This arrangement has never been carried out, as, owing to the prejudice of engineers, every other method of sinking through quicksand has been tried before recourse has been made to this one. This was the case with the Archibald sinking, and if Poetsch's method had failed, the undertaking would have had to be abandoned. It would be useful to know the cost of sinking by this manner, in order to compare it with the methods used till now in this class of undertaking, viz., sinking through quicksand. We, unfortunately, do not know to what extent the workman's health is affected by operations carried on in such a low temperature, but in the above example no evil effects occurred which were perceptible. Such a process at first sight appears incredible, and it would be a bold step to apply it to a sinking where a thick bed had to be pierced, but it cannot be denied that for short distances it has proved eminently satisfactory.

In concluding, I may remark that there is also the question of what material the lining of the shaft should consist of. At such low temperatures brickwork could not be used; if it was it would immediately give way when the normal temperature was again reached. Even with wood tubing, the water in its pores would freeze and reduce its strength in a marked degree. The method adopted at the Archibald shaft was to first case the shaft with well-dried wood, and then, when the temperature of the surrounding strata had reached its natural condition, build up a coating of brickwork inside it.

COPPER ROOFS.

Sedilia & Piscina: St. Bredon: Ch: Engd

IN a recent issue of the *Mining Gazette*, an article appears on the subject of new channels for copper, the purpose evidently being to find new demands for that material, which at present is at a very low price. The idea of introducing copper as a roofing material seems to give the writer of the article great satisfaction, and he dwells upon this topic in the following terms: —

No person erecting a building of any value, whether intended for a residence or place of business, if his attention is properly called to the matter, would hesitate to cover it with the best roofing material, provided the cost would not be too great. That copper sheathing excels all other roofing substances in economy, when its duration and absence of expense for keeping it in repair, and value for old metal when it has served its purpose, are considered, admits of no doubt. Buildings can be found in this country the roofs of which were covered with copper over one hundred years ago that are in as good condition to-day as when first put down. After copper sheathing is once in place it requires no repairing or safety covering, like slate, tin, iron or shingles, while no reasonable limit can be placed to its lastingness. In Europe copper roofs can be found that were put on over five hundred years ago. It is not our purpose to amplify this subject; our aim is simply to call attention to the matter for the purpose of invoking a practical discussion of the topic, which, if intelligently carried on, must in time result in the introduction of copper sheathing for roofing purposes. As an aid in this direction we give below a table showing the cost per one hundred square feet for covering a building with copper sheathing, with sheets running from ten ounces to the square foot up to sixteen ounces to the square foot, on a basis of raw copper at fourteen cents a pound, and allowing three cents a pound for rolling it; also a table exhibiting the thickness of the different weights of sheets: —

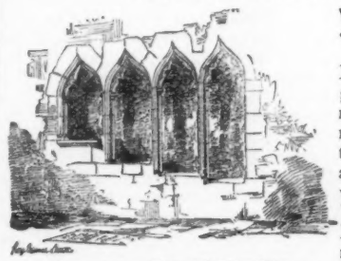
Ingot copper	$.14	$ .17
Cost of manufacturing	.03	
100 superficial feet of 10-ounce copper, 62½ pounds, cost		10.62
100 superficial feet of 12-ounce copper, 75 pounds, cost		12.75
100 superficial feet of 14-ounce copper, 87½ pounds, cost		14.87
100 superficial feet of 16-ounce copper, 100 pounds, cost		17.00

THICKNESS OF COPPER.

10-ounce copper,	73 6-10	inches	thick			28	wire	gauge
12 "	61 4-12	"	"			27	"	"
14 "	52 8-14	"	"			26	"	"
16 "	46	"	"			25	"	"

The *Metal-Worker*, commenting on the above, calls attention to several facts which, it assumes, the writer overlooked. Starting with ingot copper at fourteen cents, with the cost of manufacturing into sheathing at three cents per pound, estimates are made of the cost of copper for roofing purposes without taking into account transportation or the profits demanded by the jobbing trade. Taking these figures, however, as they appear, there is still a wide difference in cost between a copper roof and one made of some of those materials with which copper must inevitably come into competition. Copper of No. 28 wire gauge, weighing ten ounces per square foot, is shown to cost ten dollars and sixty-two cents a square; or, in other words, about four times the price of I. C. terne roofing-plates, at present market rates. We have no argument with the writer on the question of the durability of copper roofs or the appropriateness of copper for roofing purposes. On the other hand, we would be very glad to see copper very generally employed as a roofing material, for the greatest reproach to modern American buildings is that they are inadequately covered. To introduce copper, however, as popular roofing material, something more than an array of misleading figures, as given in the above statement, is necessary. However desirable copper may be for roofing purposes, there is a necessity of still lower prices of the raw material, or else a change of public sentiment with reference to the cost of buildings, in order to very largely increase the consumption in this direction. It is a fact, however, that the consumption of copper for building purposes is gradually on the increase. We have before now directed attention to its use for gutters, finials, crestings, etc., and the demand for it in this direction is growing. It might be still further stimulated to advantage, and we suggest that manufacturers of copper who have surplus stocks will do well to look in this direction. Copper cornices would be far better than galvanized-iron work for the same purpose, and copper can be worked much finer than is possible with even the best galvanized-iron.

THE MANUFACTURE OF LEAD.



Sedilia & Piscina: St. Mary's Ch: North Walsham: Engd

THE firm of Joseph Walker, Parker & Co., has works at Chester, Newcastle, Liverpool, Glasgow, Bagillt, and London, most of which are establishments sufficient in themselves to constitute a fairly important business. The Bagillt works are situated in North Wales, on the estuary of the Dee, and about seventeen miles from Chester, on the Chester and Holyhead Railway. Here the first processes of procuring lead from the ore are carried on by means of smelting in ordinary reverberatory furnaces after the manner usually followed in North Wales. There is at these works a flue of rather larger size than is usually met with. It is somewhat under two miles in length, and is arranged in a continuous spiral on a conveniently elevated plateau at the back of the works. It is built of brick in the ordinary way, and is of oval section, seven feet high, and six feet across in a horizontal direction. Into this flue are led all waste furnace gases which have been brought in contact with metal in process of reduction. The flue-dust which is carried over with the smoke and products of combustion is deposited during its passage through the long winding flue. The latter, at stated intervals, is flushed by water when the flue-dust is carried through, and is collected by allowing it to settle in large ponds made for the purpose. The sediment so obtained contains fifty-five to sixty per cent of lead. This, under the old system, would have been impartially distributed over the adjoining land to the complete destruction of any crops that might have attempted to grow in the immediate neighborhood. At the present time such vegetation as is to be seen is as green and pleasant as it can be expected to be within a short distance of a manufacturing centre. The large flue naturally occupies a great deal of land which is, perhaps, not an object of great importance at Bagillt. The principal difficulty in an arrangement of this nature is to get the dust to settle without at the same time sacrificing the draught required for the furnaces. At these works there is a chimney over 250 feet high, and 12 feet in diameter, and the additional height required to compensate for so long a flue must be considerable. We do not know whether there is any special reason why the necessary space required for the settlement of the flue-dust should not take the form of large chambers. These would occupy far less ground, whilst the rapidity with which the fumes would travel would be far less. Naturally in a flue which has the same sectional area throughout the gases will travel at approximately the same speed, and it is this speed which delays the deposition of the suspended particles of dust. Possibly, too, if chambers were used a better means of abstracting the flue-dust than the somewhat primitive one of flushing by water might be devised.

The furnaces used for smelting lead are generally about 20 feet long and about 10 feet wide. There are doors on each side, and the hearth is made up of slag. About a ton of ore with 2 cwt. of flue-dust is the usual charge of Bagillt. The reduction is by air, the furnaces in which ordinary coal slack is burned, being placed at the sides and delivering the flames above the charge on the hearth. As the metal forms during the process, at which time the charge is well worked by hand, it flows toward the tap-hole, and ultimately runs

out and is cast into pigs. About ten per cent of the metal remains in the slags left after the first working. In order to recover as much of this as possible the slag is worked up again, and in this way a hard, inferior description of lead is obtained. There is an exceedingly well-arranged desilverizing plant for the zinc process at Bagillt, which has recently been erected under the superintendence of Mr. W. M. Hutchings, the manager. The melting-pots are six feet five inches in diameter. This plant is capable of producing over 600 tons of lead per week, whilst the annual output of silver at these works is about 13 tons a year. Litharge and red lead are also made in large quantities at these works. Red lead is, as is well-known, an oxide of lead. The first process of manufacture is carried on in "drossing-ovens," of which there is a large number at Bagillt. These are of the ordinary bee-hive form, with a rather high dome in which the smoke and gases from the furnace collect until they pass out at the working door, and are carried off by an uptake conveniently placed. The pigs of lead are melted on the floor of these ovens, the molten metal being kept from running out by a dam composed of the refuse from the last working. Antimony is introduced into the bath, and the whole is kept agitated by hand-rakes. In process of time, — about six hours, — the greater part of the lead has become oxidized, and the remainder is allowed to run away to be recast and used again. The "dross" is left in the oven and kept at a high temperature, and is then ground and levigated, after which it is subjected to further oxidation in other ovens, in order to improve the color. After a further process of levigation and grinding the material only requires drying in stoves in order to become the red lead of commerce.

Sheet lead is rolled at these works, there being a rolling-mill capable of producing sheets up to 100 inches wide. A pair of cast-iron rollers, 23 inches in diameter, are mounted in cast-iron standards, and have a long bench with loose rollers on each side for working the sheets upon. There are also a couple of live rollers, worked by spur gearing, close to the mill on each side for the purpose of feeding-up the sheets. The rolls are driven by a separate engine, and the reversing is effected by a clutch gearing on to the bottom roller, which is the driven one, the top roller running loose in its bearings. When a sheet has to be rolled a slab of metal is cast, and a piece of the necessary weight, according to the gauge and area of the sheet required, is cut off. This is passed through the rolls whilst quite hot, and is gradually reduced in thickness and extended in area as the operation proceeds, until finally it becomes the familiar sheet-lead which is used for such a large variety of purposes. At each pass the top roll is brought closer to the other, its journals and their bearings being lowered in the framing by suitable hand gearing.

At the Chester Works of this firm white-lead making, pipe-drawing, and shot-making are the principal occupation. The shot are dropped from a tower in the ordinary way. The globule of molten lead assumes its spherical form as soon as it leaves the perforated tray, known technically as a card, through which it is allowed to percolate, and hardens during its descent, when it is finally caught in vats containing water, in order to prevent injury through falling from so great a height on to any hard substance. Larger shots are cast in moulds. At the Chester Works there is a large plant for drawing lead-pipe, consisting of several hydraulic presses, and the necessary gear for working them.

A press for making a solid drawn lead-pipe consists first of an hydraulic ram and cylinder, the former pressing upwards in a vertical line. On the upper part of the press there is a cylindrical vessel with which molten lead is poured and a die of the same diameter as the pipe to be drawn is then firmly wedged into the upper part of this cylinder. An iron core of smaller diameter than the hole in the die is placed concentrically to the latter, and an annular space is thus obtained, through which the lead is forced by means of the head of a ram which fits the bottom of the cylinder containing the lead. It will be manifest that the outer diameter of the pipe is regulated by the diameter of the die, whilst the thickness of metal is dependent on the size of the core. In order that the lead which comes in contact with the walls of the cylinder may not be chilled when it is first poured in, small fires are made up in receptacles provided for the purpose, or, in the case of larger presses, the cylinder is bodily heated by being placed in a gas-heated chamber. Considerable judgment is required on the part of the operator in determining when the lead is at the right temperature for the purpose. Should it be too soft it will run out in a shapeless mass, whilst if allowed to set too hard it will not work at all. A pressure of about 2,200 lbs. is obtained in the hydraulic cylinder for the smaller presses, whilst those used for producing heavier pipe work up to 6,000 lbs. to the square inch. Pure tin pipes are made in the same way, whilst tinned pipe of lead is produced by pouring a small quantity of molten tin into a hollow formed on the upper part of the die, and also by pouring a small quantity into the first few inches of pipe made as it emerges upwards from the die. This tin remains molten for a considerable time, and deposits a thin layer on both the outside and inside of the leaden pipe as it is formed.

Solid round lead is formed in the same way as the leaden pipe, the only alteration in the process being the omission of the core.

Lengths of lead of any required section, such as calm lead for glazing, can be drawn in these presses, dies of various descriptions being provided for the purpose.

Water-pipes of all standard sizes are here made as stock articles, ranging between $\frac{3}{8}$ inch-pipe, from $3\frac{1}{2}$ lbs. to $5\frac{1}{2}$ lbs. per yard, up to 6-inch barrelling up to 84 lbs. per yard. Lead and composition gas-pipe is drawn from $\frac{1}{4}$-inch diameter up to $1\frac{1}{2}$-inch diameter. A special gas-pipe, of $\frac{3}{32}$ inch diameter, is drawn for using in glass chandeliers.

White-lead is made at Chester by the ordinary stack process, in which thin castings or "crates" are subject for several weeks to the corroding influence of the fumes of acetic acid, damp bark being used to generate the required heat. The product is carbonate of lead, which, having been washed and dried in a stove, becomes the dry white-lead of commerce. Messrs. Walker, Parker & Co., also grind large quantities of white-lead in oil, having several mills of the ordinary description, and a roller-mill of ingenious construction for the purpose. The acetic acid used for the production of lead is made on the premises, and there are also appliances for boiling and refining the oil used in grinding the lead into paint. — *The Builder.*

ARCHITECTS' LIENS.

Williamsport, Pa., October 14, 1884.

To the Editors of the American Architect: —

Dear Sirs, — Can an architect collect by "*lien*" compensation for drawings and superintendence for the construction of a dwelling built in the United States? Yours, etc., A. S. Wagner.

[The precedents vary in different States. In New York it has been decided that the lien laws are not intended for the benefit of architects, but in one or two other States, where cases have occurred, a different decision has been given. — Eds. American Architect.]

ADVICE TO A STUDENT.

Lebanon, Pa., October 17, 1884.

To the Editors of the American Architect: —

Gentlemen, — As I see you answer correspondents in the *American Architect*, which I have been getting from our news agent for some time past, I venture to ask a little advice and trust to your kindness for a reply.

I have been working with an architect for more than two years, and have a very good knowledge of construction and detail, and can make drawings very neatly; I have also done some designing with good success; but as this place is small and we get mostly small buildings to make, I would like to find a place where I could advance into a higher sphere, and learn more about the practical parts of architecture, such as stability, harmony, etc. My employer thinks I should get such a place, as he cannot advance me in this place. I have no means by which to go to a school, but think I could study the theory, etc., between times, as I have passed through our common and high schools, and have a good knowledge of mathematics.

What would you advise me to do under the circumstances, and where do you think I could get a good place? Student.

[No place is too small to do good work in, and if "Student" will distinguish himself by the beautiful houses or barns which he builds in his native village, his talents will surely be appreciated in time. As to the probability of his being able at present to secure a good place in a larger town, we can say nothing, not having any knowledge of his qualifications, but it should be remembered by every student and draughtsman that a first-rate assistant, who can be relied upon to draw well, design well, write perfect specifications, and supervise work efficiently is always sure of a position, while those less thoroughly qualified must take their chances. "Student's" idea that he can study architecture "between times" is, we are afraid, somewhat delusive. He can do so, it is true, but it is a long way of learning, and not an economical one. — Eds. American Architect.]

NOTES AND CLIPPINGS.

A Tidal Motor. — Mr. Copeland, of Brockton, Mass., has nearly completed the machinery which is being placed under the Union Fish Company's wharf, Provincetown, Mass., by which the rise and fall of the tide is to be the motive power. The work is only experimental, but everything is successful thus far. The apparatus consists of a float gliding up and down on studding, which turns a wheel, making only four revolutions a tide. This wheel is connected by means of shafts and belts to a series of other wheels, and in such a way that the terminal wheel makes 240 revolutions per minute. — *New York Evening Post.*

An Extinct New Jersey Volcano. — The Orange Mountains have always been considered one of the redeeming features of Eastern New Jersey. But for this fine range of chestnut-clad hills the geographers of Essex County might be excused for believing, with the contemporaries of Columbus, that the earth is flat. The Orange Mountains are their pride and joy, the Jerseyman's picnic-ground, the locality of mysterious robberies and murders, the supposed winter resort of the seaside mosquito, and at last something has actually been found which should give these humble hills a pre-eminent position in the Appalachian system. The crater of an extinct volcano has been discovered in the mountains near Orange, and hundreds of visitors daily crowd around the interesting spot. The genuineness of the discovery is asserted upon the authority of State Geologist Cooke and many other scientific men. The prevailing geological structure of that part of the Blue Ridge range admits, however, of caves and what are commonly called "sink-holes," and if it were not for the corroboration of Professor Cooke, who enjoys a distinguished reputation in his department of science, the report would not be so readily believed as it is. The New England Society, comprising many of the foremost citizens of Orange, are arranging to obtain possession of the property on which this wonder is situated. — *New York Tribune.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

306,710-711. CRANE.—Charles J. Appleby, London, County of Middlesex, England.

306,724. METHOD OF AND APPARATUS FOR COOLING THE AIR IN REFRIGERATING-ROOMS.—Timothy C. Eastman, New York, N. Y.

306,725. METHOD OF AND APPARATUS FOR COOLING THE AIR IN ROOMS.—Timothy C. Eastman, New York, N. Y.

306,753. DOOR.—Henry M. Hopkins, Putnam, Conn.

306,763. PLANE.—Stephen G. Laskey, Chelsea, Mass.

306,795. SAFETY ATTACHMENT FOR ELEVATORS.—Walter N. Willis, Trappe, Md.

306,799. APPARATUS USED IN SINKING WELLS.—William D. Andrews, Brookhaven, N. Y.

306,800. WELL AND PUMP FOR PROCURING WATER FROM THE EARTH.—William D. Andrews, Brookhaven, N. Y.

306,801. WELL AND RESERVOIR FOR PROCURING WATER FROM THE EARTH.—William D. Andrews, Brookhaven, N. Y.

306,802-803. MEANS FOR PROCURING WATER FROM THE EARTH.—William D. Andrews, Brookhaven, N. Y.

306,806. DOOR-PROTECTOR.—Emory Barnes, Mount Pleasant, Mich.

306,816. SHUTTER.—William G. Eckstein, Chicago, Ill.

306,828. MANUFACTURE OF BRICKS.—William B. Heinize, Brooklyn, N. Y.

306,834. ELEVATOR.—Samuel Keim, Altoona, Pa.

306,843. FIRE-ESCAPE.—William E. Lindop, St. Thomas, Ontario, Can.

306,848. FIRE-ESCAPE.—Thos. D. McKinzie, Colorado, Tex.

306,858. BRICK-MACHINE.—Napoleon M. Plante, Verplanck, N. Y.

306,859. CELLAR DRAIN AND VENTILATOR.—Michael Posz, Shelbyville, Ind.

306,862. SCREW-DRIVER.—Jas. M. Rickets, Charleston, Ill.

306,869. COMBINATION DRAWING-INSTRUMENT.—Joseph McMasters Scott, Allegheny City, Pa.

306,871. FIRE-ESCAPE.—Charles F. Shore, Sacramento, Cal.

306,877. BENCH-PLANE.—Justus A. Traut, New Britain, Conn.

306,880. VALVE FOR RADIATORS.—George J. Wallace, New York, N. Y.

306,888. BENCH FOR JOINTING LUMBER.—Clarence A. Williams, Webster City, Io.

306,907. AUGER-BIT.—William M. Dimitt, Martinsville, O.

306,912. FIRE AND WATERPROOF ROOF-PAINT.—Chas. F. Fowler and Robert H. Foss, Lake City, Minn.

306,929. AUTOMATIC SEWER-GAS VALVE.—Frank G. Johnson, New York, N. Y.

306,940. WATER-CLOSET BOWL.—James Milliken, New York, N. Y.

306,942. SECTIONAL HOUSE.—Frank H. Morse, New Orleans, La.

306,960. BRICK-KILN.—Benton Retherford, Bringhurst, Ind.

306,970. DOOR-CLOSING DEVICE.—Nathan M. Stebbins, Wales, Mass.

306,973. DEVICE FOR RAISING BUILDINGS.—Daniel Scott, Wilmington, O.

306,976. LOCK.—Geo. Thumshirn, Branford, Conn.

306,981. GREASE-TRAP.—Nathaniel T. Whiting, San Francisco, Cal.

306,983. WINDOW-SASH PULLEY.—Henry A. Wilbur, Cambridge, Mass.

306,994. ATTACHMENT FOR WINDOW BLINDS.—Andrew J. Avery, Lynn, Mass.

307,019. FIRE-ESCAPE.—Jesse W. Corder, Grand Rapids, Mich.

307,023. FIRE-ESCAPE.—Jos. T. Davis, Newark, O.

307,049. PNEUMATIC ELEVATOR-SIGNAL.—Jno. Hunt, New York, N. Y.

307,055. REMEDY AGAINST DRY-ROT AND DAMPNESS IN WALLS.—August Kothe, Hanover, Prussia, Germany.

307,058. BURGLAR-ALARM.—Charles E. Luburg, Philadelphia, Pa.

307,064. AUTOMATIC MACHINE GOVERNED BY ELECTRICITY FOR CONTROLLING ELEVATORS.—Chas. E. Ongley and Emery W. Sturtevant, Worcester, Mass.

307,065. MORTISING-MACHINE.—James Oppenheimer, Shenandoah, Io.

307,078. GUIDE-TRACK FOR SLIDING DOORS.—Wm. R. R. Tillion, Brooklyn, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS.—Since our last report forty permits have been granted, the more important of which are the following:—

Bauernschmidt & Marr, 2 two-st'y brick buildings, n s Ridgely St., bet. Bayard and Wooster Sts.

Francis Denmead, seven-st'y storage warehouse, e s West Falls Ave., bet. Block St. and City Dock.

Geo. Bunnecke, 3 two-st'y brick buildings, s s St. Peters St., com. n w cor. Parkin St.

H. C. Smyser, 17 two-st'y brick buildings, n s Christian St., bet. Monroe and Payson Sts.

Alex. Lang, three-st'y brick building, e s Charles St., n e cor. Cross St.

B. F. Bateman, three-st'y brick building (square), w s Light St., bet. West and Ostend Sts.

Otto Goldbach, 5 three-st'y brick buildings, e s Wolfe St., bet. Jefferson and McElderry Sts.

Fred'k Burger, 8 two-st'y brick buildings, e s Cannon St., bet. Lancaster and Aliceanna Sts.; 8 two-st'y brick buildings, w s Rose Alley, bet. Lancaster and Aliceanna Sts., and 2 two-st'y brick buildings, n s Lancaster St., bet. Luzerne St and Rose Alley.

W. J. E. Diven, 3 two-st'y brick buildings, e s Mount St., bet. Lorman and Presstman Sts., and 4 two-st'y brick buildings, w s Vincent Alley, between Lorman and Presstman Sts.

John Scherer & Son, three-st'y brick building, s s Raborg St., bet. Poppleton and Fremont Sts.

Chas. Wilkins, 8 two-st'y brick buildings, n s Ramsay St., w of Monroe St.

Wm. Gisriel, three-st'y brick building, w s Halliday St., bet. Saratoga and Pleasant Sts.

Wm. H. Perkins, three-st'y brick building, s e cor. Eutaw Pl. and Townsend St.

F. H. Shallus, 2 three-st'y brick buildings, n s Preston St., w of McKim St.

Wm. G. Scarlett, 4 three-st'y brick buildings, e s McCulloh St., n of Laurens St.

Harry Hall, three-st'y brick building, s s Baltimore St., e of Broadway.

Sophia C. Bauer, three-st'y brick building, e s Carlton St., s of Harlem Ave.

Mary M. Wheeden, 2 three-st'y brick buildings, es Broadway, bet. Eastern Ave and Bank St.

The labor quotations remain unchanged for November.

Boston.

BUILDING PERMITS.—*Border St., No.* 406, Ward 1, for Isaac Pratt, Jr., brick boiler and engine house, 30′ x 40′, flat; Littlefield & Folsom, builders.

Beacon St., No. 314, Ward 11, for Jas. W. Converse, brick dwell., 46′ x 75′ 6″, hip; J. H. Kelley, builder.

Longwood Ave., near Bumstead Lane, Ward 22, for Jas. McCormick, brick storage, 38′ x 100′, flat; Jas. Fegan, builder.

Beacon St., cor. Bowdoin St., Ward 10, for American Unitarian Association, brick offices, 35′ 6″ x 85′, flat; Woodbury & Leighton, builders.

Clifton St., Ward 20, for J. Breckenbridge, wooden dwell., 32′ x 34, flat; R. Parks, builder.

Paris St., cor. Meridian St., Ward 2, for Edwin Gertz, wooden photograph-gallery, 10′ x 22′, pitch.

Clifton St., near Batchelder St., for Mrs. A. E. Haley, wooden dwell., 24′ x 54′, pitch.

Whitney St., No. 22, for Jas. O'Brien, wooden dwell., 20′ x 24′, pitch; Max Weise, builder.

Tremont St., near Oak Sq., Ward 25, for B. F. Fiske, wooden dwell., 28′ x 40′, hip; Jas. Keefe, builder.

Tremont St., near Oak Sq., Ward 25, for C. E. Marshall, wooden dwell., 28′ x 40′, hip; Jas. Keefe, builder.

Rockland St., cor. Washington St., Ward 23, for Fedalia Club, wooden dwell. and hall, 26′ x 40′, pitch; Jno. String, builder.

St. John St., near Centre St., Ward 23, for Albert Lewis, wooden dwell., 28′ x 30′, pitch; M. D. Ayers, builder.

Crescent Heights, Ward 1, for M. E. Sprague, wooden dwell., 27′ x 34′; mansard; S. E. Sprague, builder.

Greenwich St., near Dorchester Ave., Ward 24, for P. M. Finnegan, 2 wooden dwells., 22′ x 30′, flat; Jos. C. Reed, builder.

Poplar St., cor. Hilborn St., Ward 23, for Alex. Rogers, wooden dwell., 7′ x 18′ and 28′ x 30′, pitch; Alex. Rogers, builder.

Brooklyn.

BUILDING PERMITS.—*First St.*, n s, 115′ 10″ e Seventh Ave., two-st'y brick and brown-stone dwell., tin roof; cost, $6,000; owners, etc., Martin & Lee, 440 Clermont Ave.

First St., n s, 90′ 10″ e Seventh Ave., 1 three-st'y and 2 two-st'y and basement brown-stone dwells.; cost, $9,000 and $6,500 each; owners, etc., Martin & Lee, 440 Clermont Ave.

Park Pl., n s, 180′ 5″ w Sixth Ave., four-st'y brown-stone tenement, tin roof, wooden cornice; cost, $12,000; owner and builder, John Monas, Park Pl.; architect, J. J. Gilligan.

Park Ave., s e cor. Graham St., four-st'y brick store and dwell., tin roof; cost, $8,500; owner, Gustav C. Weidig, n e cor. Park Ave, and Graham St.; architect, Carl A. Eisenach; builders, Donlon & Walton and Wm. Zang.

Meserole St., s s, abt. 200′ e Bushwick Ave., one-st'y brick boiler-house, iron roof; cost, $3,000; owner, Otto Huber; architect, Charles Stoll.

Patchen Ave., w s, 37′ n Madison St., 2 two-st'y brick dwells., felt and gravel roofs; cost, abt. $3,500 each; owner, Charles Hall, 63 Patchen Ave.; architect, F. F. Thomas.

Fourth Ave., n e cor. Thirteenth St., three-st'y brick tenement, tin roof; cost, $3,500; owner, Thos. Pitbladdo, 213 Seventeenth St.; architect, B. S. Brown; builders, W. & T. Corrigan.

Madison St., s s, 25′ w Throop Ave., 10 two-and-a-half-st'y brown-stone dwells., tin roofs; cost, each, $5,000; owner, Paul C. Grening, 420 Gates Ave.

Madison St., s w cor. Throop Ave., three-st'y brick flat, tin roof; cost, $10,000; owner, Paul C. Grening, 420 Gates Ave.

Prospect Pl., No. 208, s s, 220′ 8″ w Vanderbilt Ave., tin roof; cost, $6,000; owner and mason, David H. Hill, 393 Flatbush Ave.; architect, Walter Coots; carpenter, Geo. Scheel.

Locust St. Nos. 15, 17, *and* 19, n s, 150′ e Broadway, 3 three-st'y frame tenements, tin roofs; cost, each, $4,500; owner, Valentin Popp, cor. Throop Ave. and Floyd St.; builders, William Maschke and John Rueger.

Lorimer St., e s, 100′ s Devoe St., four-st'y frame (brick filled) tenement, tin roof; cost, $5,000; owner, Mary J. Smith, 248 Lorimer St.; architect, E. F. Taylor; mason, Matthew Smith.

Pineapple St., n s, 150′ e Hicks St., five-st'y boarding-house, tin and slate roof; cost, $18,000; owner, William Tumbridge, 78 Hicks St.; architect, Augustus Hatfield.

Prospect Ave., s e cor. Fourth Ave., 5 three-st'y brick tenements and store and tenement, tin roofs; cost, each, $5,000; owner and builder, M. A. Wood, 98 Fifteenth St.; architect, C. B. Sheldon.

Thirteenth St., n s, 97′ 10″ w Sixth Ave., 4 two-st'y brick dwells., tin roofs, wooden cornices; cost, each, $3,500; owner, etc., Edwin C. Squance.

Thirteenth St., Nos. 211 *and* 213, n s, 25′ e Fourth Ave., 2 two-st'y brick dwells., tin roofs; cost, each, $2,800; owner, Thomas Pitbladdo, 213 Seventeenth St.; architect, B. S. Brown; builders, W. & T. Corrigan.

Margaretta St., s s, 192′ w Bushwick Ave., two-st'y brick dwell., felt and gravel roof; cost, $3,000; owner and builder, J. D. Mason, 37 Hopkinson Ave.

Eighth St., n s, 222′ 10″ w Seventh Ave., 4 two-st'y brown-stone dwells., tin roofs; cost, each, $4,000; owner and builder, John Heesch, 20 Webster Pl.; architect, Mr. Bremerhoff.

Marion St., n s, 100′ e Howard Ave., 4 two-st'y frame (brick-filled) dwells., tin roofs; cost, each, $2,500; owner and architect, Augustus B. Pettit, 283 Chauncey St.; builders, Ernst Sutterlin and William Cunningham.

Lafayette Ave., s s, 60′ e Lewis Ave., 2 two-st'y brown-stone dwells., tin roofs; cost, each, $5,300; owner, M. J. McLaughlin, 100 Kosciusko St.; architect, F. D. Van Pelt.

Skillman St., No. 105, e s, 232′ n Myrtle Ave., three-st'y frame (brick-filled) tenement, gravel roof; cost, $5,500; owner, Wm. B. Cox, Ryerson St.; architect, J. G. Glover; builder, not selected.

South First St., No. 386, 100′ e Eleventh St., two-st'y brick blacksmith shop, and dwell., tin roof; cost, $4,500; owner, John H. Tourte, 388 South First St.; architect, Th. Engelhardt; builders, Jas. Mead & Son and John Rueger.

Floyd St., n s, 150′ e Marcy Ave., 2 three-st'y frame (brick-filled) dwells., tin roofs; cost, each, $5,500; owner, Andrew Froelich, 202 Stockton St.; architect, Th. Engelhardt; builders, John Fuchs and H. Eich & Bro.

McKibbin St., No. 183, n s, 175′ e Humboldt St., three-st'y frame (brick-filled) tenement; cost, $4,500; owner, George Seitz, 179 McKibbin St.; architect, Th. Engelhardt.

Metropolitan Ave., No. 101, s s, 125′ e Bushwick Ave., three-st'y frame (brick-filled) tenement, tin roof; cost, $2,500; owners, A. Amann & Son, 258 Devoe St.; architect, H. Vollweiler; builders, John Brendel and A. Amann & Son.

Myrtle Ave., s s, 558′ e Evergreen Ave., 2 three-st'y frame (brick-filled) tenements, tin roofs; cost, each, $4,000; owner, etc., John Rueger, 250 Moore St.

Myrtle Ave., s s, 500′ e Evergreen Ave., 2 three-st'y frame (brick-filled) stores and tenements, tin roofs; cost, each, $5,000; owner, etc., John Rueger, 250 Moore St.

Bushwick Ave., w s, 25′ s Boerum St., three-st'y frame (brick-filled) store and tenement, tin roof; cost, $4,200; owner, Magdal Stutzmann, cor. Seigel and Humboldt Sts.; architect, H. Vollweiler, builder, John Rueger.

Broadway, e s, 40′ s Van Buren St., three-st'y frame (brick-filled) flat, tin roof; cost, $4,000; owner, Samuel Post, cor. Broadway and Van Buren St.; architect, H. Vollweiler; builder, S. Post.

Boerum St., s e cor. Bushwick Ave., three-st'y frame (brick-filled) store and tenement, tin roof; cost, $5,500; owner, Magdalena Stutzmann, cor. Seigel and Humboldt Sts.; architect, H. Vollweiler.

Fifth Ave., n e cor. Union St., 5—three three-st'y, and 2 two-st'y — stores and dwells., tin roofs; total cost, $35,000; owner, William Irvine, 395 Ninth St.; architect, J. C. Burne; builder, W. J. Conway.

Humboldt St., s w cor. Siegel St., four-st'y brick warerooms, tin roof; cost, $10,000; owner, Martin Worn, Humboldt and Seigel Sts.; architect, John Platte; builder, Jacob Kauth.

Madison St., n s, 35′ e Tompkins Ave., 5 two-st'y brown-stone dwells., tin roofs; cost, each, $5,000; owner and builder, Jas. A. Thompson, 405 Monroe St.; architect, M. Walsh.

Willow Pl., w s, 100′ n State St., five-st'y apartment-house, tin roof; cost, $20,000; owner, William Tumbridge, 78 Hicks St.; architect, Augs. Hatfield.

Central Ave., n e cor. George St., 2 frame (brick-filled) three-st'y stores and tenements, tin roofs; cost, abt. $7,000; owner, Charles Engert, 182 Montrose Ave.; architect, F. J. Berlenbach.

ALTERATIONS.—*South Fifth St.*, s s, 100′ w Second St., add one st'y, flat tin roof; cost, $3,500; owner, George Young, First St., cor. South Fourth St.; architect, E. F. Gaylor; builders, James Rodwell and Sam'l Hough.

Irving St., s s cor. Van Brunt St., repair damage by fire; cost, $3,300; owner, Estate of Chas. Kelsey, 156 Columbia St.; architect, Fred. Hitzelberger; builders, Mr. Gibbons and Wm. Clark.

Prospect Pl., n s, 200′ e New York Ave., 2 two-st'y brick extensions; cost, $3,000; owner, H. L. Wardwell; architect, G. Chappel; builders, James Ashfield and M. C. Rush.

Bushwick Ave., n e cor. Nimrod St., three one-st'y frame extensions, tin roof; cost, $4,500; owner, South Bushwick Ref. Church; architects, Parfitt Bros.; builder, E. Henderson.

Meserole St., s s, 200′ e Bushwick Ave., five-st'y brick extension, tin roof (brewery); cost, $20,000; owner, Otto Huber, Meserole St.; architect, Chas. Stoll.

Chicago.

CHURCH.—The Third Presbyterian Church which recently was totally destroyed by fire, only outside stone walls left standing, will be rebuilt at once; W. L. B. Jenney is the architect. The total cost of the structure burned was about $140,000.

LIBRARY-BUILDING.—N. S. Patton Architect, planned the $60,000 library-building, to be erected at Oak Park for the Scoville Institute, Lyons limestone and Bedford stone.

HOSPITAL.—Work on the Chicago Hospital for Women and Children, on West Adams Street, is going rapidly forward, four-st'y, 48′ x 125′, with an ell, 20′

x 40′; capacity for 100 patients; cost, $65,000. Laying of corner-stone was celebrated last week.

BUILDING PERMITS.—J. H. Buffum, two-st'y dwell., 368 Ontario St.; cost, $7,000; architect, S. H. Randolph; builder, W. H. Cameron.

M. Stock, 3 two-st'y dwells., 11-15 Wendell St.; cost, $15,000.

A. F. Stevenson, three-st'y dwell., 417 Lasalle Ave.; cost, $15,000; architects, Bauer & Hill.

C. H. Curtis, 2 two-st'y dwells., 2-4 College Pl.; cost, $10,000; architects and builders, Wm. Price & Son.

H. Goldsmith, three-st'y dwell., 242 Indiana St.; cost, $8,000; architects, Strippelman & Co.

H. Sweet, three-st'y store and flats, 1459 Milwaukee Ave.; cost, $4,000.

M. Ransom, two-st'y flats, 812 Washtenaw Ave.; cost, $2,700.

Late & Ensign, two-st'y dwell., 1063 Halsted St.; cost, $2,500.

J. Robinson, 2 two-st'y dwell., 1055 North Halsted St.; cost, $4,500.

Thos. Hoyne Estate, five-st'y store, 91 Michigan Ave.; cost, $15,000.

Mrs. K. Wagner, two-st'y brewery, 70 Clyde St.; cost, $5,000; builder, L. Kobell.

P. Ratley, two-st'y dwell., 2962 Bonfield St.; cost, $6,500; architects; Furst & Rudolph.

J. H. Murphy, two-st'y dwell., 54 Goethe St.; cost, $3,500.

Hoffman Bros., two-st'y factory, 43-49 Green St.; cost, $6,000; architect, D. S. Pentecost; builder, J. Miles.

N. F. Merrill, two-st'y dwell., 1401-1403 Washington Boul.; cost, $7,000; architect, J. H. Moore.

J. Doig, two-st'y dwell., 450 Warren Ave.; cost, $3,000.

F. Kamin, 2 two-st'y stores and dwells., 664-666 West North Ave.; cost, $10,000; architects, Schaub & Berlin; builder, Chas. Proeger.

H. McFarlane, two addition st'y, Canal St.; cost, $5,000.

H. D. Rowland, two-st'y dwell., 56 Wisconsin St.; cost, $4,000; architect, H. Starbuck; builder, G. Eberlin.

Mr. C. Zimmerman, three-st'y dwell., 754 North Ashland Ave.; cost, $3,000; builders, M. & N. Zimmerman.

L. P. Hansen, five-st'y store, 116-118 Dearborn Ave.; cost, $40,000; architect, J. Addison; builders, Barney & Rodatz.

Mrs. T. L. Morey, two-st'y dwell., 394 Warren Ave.; cost, $3,000; architect, F. P. Schock; builders, Barney & Rodetz.

J. W. Farlin, two-st'y dwell., 467 North State St.; cost, $12,000; architects, Cobb & Frost; builder, Mountain.

A. Mullen, two-st'y store and dwell., 146 Ambrose St.; cost, $4,000.

M. E. Sands, 6 two-st'y dwells., 727-737 West Harrison St.; cost, $15,000.

N. Lancaster, 8 cottages, 322-348 Thirty-ninth St.; cost, $9,000.

C. A. Sirbon, three-st'y dwell., 113-115 Wesson St.; cost, $8,000.

M. Cremen, three-st'y store and dwell., 275 Douglass Ave.; cost, $8,000.

A. Ferman, three-st'y dwell., 639 North Robey St.; cost, $6,000.

Geo. R. McClellan, two-st'y storehouse, 1620 Butterfield St.; cost, $2,500; architect, L. J. Daegling.

Wm. Gillan, three-st'y store and dwell., 212 Thirty-fifth St.; cost, $12,000; architect, J. W. Ackerman; builder, R. E. McKay.

J. K. Bigelow, two-st'y dwell., 11 Page St.; cost, $3,500; architect, H. R. Wilson.

Bartholomae & Leicht, elevator, 501 Garfield Ave.; cost, $20,000; architect, F. Wolff.

A. Gretzner, two-st'y store and dwell., 773 Thirty-seventh St.; cost, $2,500.

New York.

FLATS.—On the n e cor. of Ninth Ave. and Forty-fifth St., 9 five-st'y brick, brown-stone and terra-cotta flats are to be built by Mr. Wm. Rankin, from plans of Mr. M. L. Ungrich, to cost about $180,000.

For Mrs. G. Gossan, a five-st'y brick, stone and terra-cotta flat is to be built, at No. 328 East Seventy-seventh St., at a cost of $18,000, from plans of Mr. Ernest W. Greis.

SAFE DEPOSIT WAREHOUSE.—The Lincoln Safe Deposit Co. will have an addition, 50′ x 90′, built, fronting on Forty-first St., from designs of Mr. J. B. Snook.

SKATING RINKS.—On Fifty-third St., Broadway and Seventh Ave., a one-st'y brick skating-rink, to cost about $30,000, is to be built from designs of Mr. A. B. Ogden.

On Lexington Ave., cor. Fourth Ave. and One Hundred and Seventh St., a one-st'y brick rink, 335′ deep, is to be built from plans of Messrs. E. D. Howes & Co.

STABLE.—Mr. Richard Weber is to have a stable and warehouse, 25′ x 100′, erected on One Hundred and Twentieth St., between Second and Third Aves., from designs of Mr. I. S. Wightman.

BUILDING PERMITS.—*Lexington Ave.*, e s, 60′ s One Hundred and Twenty-fifth St., one-st'y brick building (roller-skating rink), tin roof; cost, $15,000; owner, Wm. A. Martin, 128 West One Hundred and Twenty-third St.; architect, Jos. M. Dunn.

Monroe St., Nos. 300 *and* 302, six-st'y brick factory, tin roof; cost, $25,000; owner, Henry A. Dingee, 150 East Sixty-first St.; architect, L. H. Broome.

Ninety-second St., n s, 204′ 5″ e Fifth Ave., four-st'y brown-stone dwell., tin roof; cost, $32,000; owners, Samuel and Isaac Untermeyer, 106 East Ninety-second St.; architects, Hugo Kafka & Co.; builder, Alfred Beinhauer.

One Hundred and Sixty-third St., n s, w s Union Ave. and e s Minton Ave., 17 two-st'y frame dwells., tin roofs; cost, each, $1,800; owner and builder, John W. Decker, 841 Forrest Ave.; architect, Adolph Pfeiffer.

Ludlow St., No. 67, six-st'y brick tenement, tin roof; cost, $20,000; owner, Edward J. Burke, 156 East Thirty-eighth St.; architect, John C. Babcock.

Sixty-fourth St., n s, 250′ e Third Ave., three-st'y brick stable and dwell., tin roof; cost, $10,000; lessee and builder, John Bartnett, 121 East Sixty-third St.

West Fifty-seventh St., Nos. 23 *and* 25, seven-st'y brick and stone apartment-house, tin and slate roof; cost, $140,000; owners and architects, Lamb & Rich, 486 Broadway; builder, not selected.

St. Nicholas Pl., e s, opposite One Hundred and Fifty-first St., three-st'y brick dwell., slate roof, owner, James M. Cumings, 125 West One Hundred and Twenty-seventh St.; architect, Henry S. Rapelye; builder, not decided.

Ninety-ninth St., s s, 100′ w Eleventh Ave., five-st'y brick and stone flat, tin roof; cost, $25,000; owner, Lorenzo Power, 612 West Eighty-third St.; architect, Wm. Schickel.

East Seventy-sixth St., No. 456, two-st'y brick dwell., tin roof; cost, $8,000; owner, Louis Spitzer, 452 East Eighty-first St.; architect, Th. De Lemos; builders, Kitchen & Nason.

One Hundred and Fourth St., s s, 250′ e Third Ave., 4 five st'y brick tenements and stores, tin roofs; cost, each, $16,000; owner, Henry Bornkamp, 306 West One Hundred and Twenty-seventh St.; architects, Cleverdon & Putzel.

West Sixteenth St., No. 240, five-st'y brick, tin roof; cost, $15,000; owner, James Cunningham, 130 Clinton Pl.; architect, Emile Gruwe; builder, H. M. Reynolds.

West Thirty-eighth St., Nos., 355 *and* 357, 2 five-st'y brick tenements, tin roofs; cost, $6,500 and $8,500; owner, Sarah McGrave, 220 West Thirty-ninth St.; architect, John M. Forster.

East Fifty-fourth St., No. 224, two-st'y brick wash-house, tin roof; cost, $3,000; owner, Henry Gunther, 213 East Fifty-fourth St.; architect, Chas. Stoll.

Sixty-third St., n s, 250′ e Tenth Ave., 2 five-st'y brick and stone flats, tin roofs; cost, each, $15,000; owner, Owen Donohue, 505 West Fifty-sixth St.; architect, John Sexton.

One Hundred and Forty-ninth St., n s, 250′ e Courtland Ave., 2 three-st'y frame tenements, tin roofs; cost, each, $5,500; owners and builders, Janson & Jaeger, 551 Courtland Ave.; architect, Adam Janson.

Eighty-first St., s w cor. Ninth Ave., four-st'y brick store and dwell., tin roof; cost, $13,000; owner and builder, Eli Martin, 614 Carroll St., Brooklyn.

Eighty-first St., s s, 30′ and 60′ w Ninth Ave., 2 four-st'y brick and stone dwells., tin roofs; cost, each, $11,000; owner and builder, same as last.

Eighty-first St., s s, 90′ and 112′ w Ninth Ave., 2 four-st'y brick and stone dwells., tin roofs; cost, each, $10,000; owner and builder, same as last.

Morris Ave., s w cor. One Hundred and Thirty-ninth St., three-st'y brick factory, tin roof; cost, $3,030; owner, architect and builder, Edward Gustaveson, 547 East One Hundred and Forty-second St.

ALTERATIONS.—*Lexington Ave.*, n e cor. One Hundred and Eighth St., one-st'y brick extension, tin roof, build new chimney in main building, new partition; cost, $5,000; owners, Steers Bros., foot East One Hundred and Twenty-fifth St.; architect, Thos. J. Robinson.

One Hundred and Twenty-ninth St., foot of, and East River, rebuild for factory purposes, building damaged by fire; cost, $5,000; owner, Wm. H. Payne, 98 Park Ave.; architect, J. F. Burrows.

Second Ave., No. 1021, one-st'y brick extension, tin roof, rear of main building taken out in first st'y and iron girder put in; also, internal alterations; cost, $2,500; owner, Minnie Rinaldo, 220 East Thirty-third St.; architect, J. G. Michel; builders, M. Schmeckenbecher's Sons.

West Twenty-second St., Nos. 37, 39 *and* 41, *and Nos.*—*on Twenty-third St.* (old church-building), internal and external alteration of church into stores and lodgings, and three extensions, tin roofs; cost, done by day's work; owners, James Russell White, 80 Beaver St., and others; architect, W. Wheeler Smith; builders, John Tucker and Alf. C. Hoe & Co.

Broome St., No. 236, raise attic to full story, three-st'y brick extension, tin roof; cost, $4,500; owner, Ludwig Trunk, 240 Broome St.; architect, William Graul.

East Fiftieth St., Nos. 107 *and* 109, first st'y to be altered for stable; cost, $3,000; owner, the F. & M. Schaefer Brewing Co., Fifty-first St. and Fourth Ave.; architect, Julius Kastner.

Philadelphia.

BUILDING PERMITS.—*Dean St.*, cor. Tasker St., two-st'y dwell., 16′ x 44′; T. B. Twibill, contractor.

Aman St., between Eleventh and Twelfth Sts., 2 three-st'y dwells., 15′ x 40′; C. O'Neill.

Tasker St., between Twelfth and Thirteenth Sts., 2 two-st'y dwells., 14′ x 40′; T. B. Twibill, contractor.

Connarol St., between Pechin and Mitchell St., three-st'y dwell., 18′ x 45′; W. Goodfellow, contractor.

Indiana St., cor. Reese St., three-st'y store and dwell., 18′ x 43′; S. M. Batton, contractor.

Erie Ave., w of Sixth St., 3 two-st'y dwells., 13′ 8″ x 45′; T. Cole, owner.

Frankford St., between Frankford Creek and Melrose St., three-st'y factory, 30′ x 140′; W. Grange, president.

Woodford St., between Manayank Ave. and Richter St., three-st'y dwell., 16′ x 32′; McIlvain & Cunningham.

Oxford St., e of Twenty-eighth St., 8 two-st'y dwells., 14′ 6″ x 42′; Wm. Pole, contractor.

Kensington Ave., between Venango St. and Harrowgate Lane, three-st'y store and dwell., 20′ x 48′; D. C. Shuler, contractor.

Woodvale Ave., near Manayank Ave., 2 two-st'y dwells., 17′ x 35′; Chas. Bartle, contractor.

Bowman St., w of Thirty-fifth St., three-st'y dwell., 13′ 4″ x 32′; Wm. Kindon, owner.

Fifty-first St., cor. Florence St., two-st'y dwell., 14′ x 32′; A. J. Moseley.

Ridge Ave., between Susquehanna Ave. and Diamond St., three-st'y dwell., 19′ x 46′; R. Manly.

North Twenty-second St., No. 227, three-st'y dwell., 17′ x 50′; P. Thompson, contractor.

Edgemont St., between Neff and Clearfield Sts., 2 two-st'y dwells., 16′ x 40′; J. W. Bright, contractor.

Adam St., cor. Duval St., three-st'y dwell., 27′ 6″ x 52′ 6″; W. H. Brunner, contractor.

Neff St., cor. Clifton St., church-building, 34′ x 68′; H. M. Martin, contractor.

North Fifth St., No. 2725, three-st'y dwell., 18′ x 22′; H. M. Martin, contractor.

Norris St., w of Second St., three-st'y dwell., 18′ x 52′; D. J. Dunbar, contractor.

Wayne St., n of Berkley St., 2 two-st'y dwells., 16′ x 45′; Samuel Clawson.

Twenty-seventh St., n of Oxford St., two-st'y dwell., 18′ x 40′; J. Huston, contractor.

South Thirteenth St., No. 1827, three-st'y store and dwell., 16′ x 25′; E. H. Steever, contractor.

Sansom St., w of Eighth St., traction engine-house, 100′ x 107′; S. Hart, contractor.

Edward St., between Hanover and Second Sts., refrigeratory-building, 50′ x 72′; J. B. Doyle, contractor.

Fifty-ninth St., n of Kingsessing Ave., orphanage-building and chapel, 60′ x 100′; A. A. Catanach, contractor.

General Notes.

ALBERT LEA, MINN.—Cottage, for Chas. Farnsworth; cost, $3,500; C. A. Dunham, architect, Burlington, Iowa.

KANSAS CITY.—F. J. Baird & Milton Welsh, brick business block, 1828-30 Main St.; cost, $8,000.

W. J. Scott, 4 frame dwells., East Tenth St.; cost, $8,000.

W. J. Smith and George J. Keating, brick warehouse, West Tenth St.; cost, $15,000.

J. W. Keifer, brick residence, Penn St.; cost, $6,000.

Henry Sleek is erecting a brick livery-stable at 921 Wyandotte St.; cost, $3,500.

PROPOSALS.

SAFES AND VAULTS.

[At Washington, D. C.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., October 23, 1884.

Sealed proposals will be received at this office **until 2 P. M., on the 25th day of November, 1884**, for supplying the burglar-proof safes and chests, fire and burglar safes combined, fire-proof safes, fire-proof doors, shell safes, and single and double steel-lined vault-work required by the Treasury Department, and as may be ordered during the fiscal year ending June 30, 1885, in accordance with drawings and specification, copies of which and any additional information may be had on application at this office, on and after November 5, 1884.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered.

M. E. BELL,
461 Supervising Architect.

IRON-WORK.

[At Jackson, Tenn.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., October 18, 1884.

Sealed proposals will be received at this office **until 2 P. M., on the 1st day of November, 1884**, for furnishing and putting in place complete, the iron columns and girders required for the court-house, post-office, etc., at Jackson, Tenn., in accordance with drawings and specification, copies of which and any additional information may be had on application at this office, or the office of the superintendent.

Bids must be accompanied by a certified check, and those received after the time of opening, will not be considered.

M. E. BELL,
462 Supervising Architect.

IRON WORKS.

[At St. Louis, Mo.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., October 24, 1884.

Sealed proposals will be received at this office **until 2 P. M., on the 8th day of November, 1884**, for furnishing and fixing in place complete the cast-iron ornamental panels for area railing around the custom-house and post-office building at St. Louis, Mo., in accordance with drawing and specification, copies of which may be seen and any additional information obtained on application at this office, or the office of the custodian at the building.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered.

M. E. BELL,
464 Supervising Architect.

ARMY BARRACKS.

[At Newport, R. I., and New York, N. Y.]

OFFICE OF CHIEF QUARTERMASTER,
DEPARTMENT OF THE EAST,
GOVERNOR'S ISLAND, N. Y. H., October 15, 1884.

Sealed proposals in triplicate, subject to the usual conditions, will be received at this office, and the Offices of the Quartermaster at the posts mentioned below, **until 12 o'clock, M., Eastern time, on the 15th day of November, 1884**, at which time and places they will be opened in the presence of the bidders, for the construction of one set of barracks of brick, or frame, at each of the posts of Fort Adams, R. I., and Fort Hamilton, N. Y. H., in accordance with plans and specifications, which can be seen at this office, and at the Offices of the Post Quartermaster at Fort Adams, R. I., and Fort Hamilton, N. Y. H.

One copy of this advertisement should be securely attached to each triplicate proposal, and be mentioned therein as comprising part of it.

Blanks for proposals and information as to manner of bidding, etc., can be obtained at this office.

Proposals must be accompanied by a guarantee with two sureties in the sum of two hundred dollars.

A proposal not accompanied by such a guarantee will not be considered.

Envelopes containing proposals should be marked "Proposals for Construction of Barracks."

The Government reserves the right to reject any or all bids.

ALEX. J. PERRY,
462 Assistant Quartermaster General, U. S. Army.

Publishers' Department.

The American Architect and Building News.

PUBLISHED EVERY SATURDAY BY

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211 TREMONT STREET, BOSTON, MASS.

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15 cents per copy; $6.00 per year; six months, $3.50; 12 Monthly Numbers, $1.75.

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PROPOSALS.

PAINTING, BRONZING, AND POLISHING. [At Cincinnati, O.]

OFFICE OF SUPERVISING ARCHITECT, TREASURY DEPARTMENT, WASHINGTON, D. C., October 17, 1884.

Sealed proposals will be received at this office **until 2 P. M., on the 8th day of November, 1884,** for all the painting, bronzing, and polishing required for the custom-house and post-office building at Cincinnati, O., in accordance with specification, copies of which and any additional information may be had on application at this office, or the office of the superintendent.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered.

M. E. BELL, Supervising Architect

462

New Advertisements.

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D. APPLETON & CO. (New York), Books. Page 4, Supplement.
PORTABLE HOUSE AND MANF'G CO. (New York), Portable Houses. Page xi.

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CANVASSERS.—One or more canvassers who can furnish satisfactory references. Address the *American Architect*, 211 Tremont St., Boston.

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STEAM DERRICKS.—For sale, at the works of Wm. Struthers & Sons, n w cor. Twenty-fourth and Walnut Sts., Philadelphia, two overhead steam derricks, with false works and rail. Frames and rippers of Merriman's patent, including steam engine and boiler, with pump; also pulleys and shaft'ng connected with saws. Steam crane on end of wharf. All the above machinery in very good order. Can be removed from the premises on or about the middle of January, 1885. Tools and other utensils connected with the marble work included. Apply at the office of the firm, n w cor. Twenty-fourth and Walnut Sts., Philadelphia, Pa.

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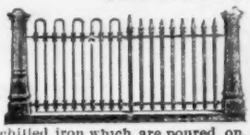

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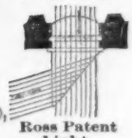

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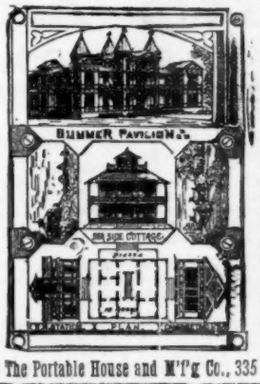

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The Portable House and M'f'g Co., 335 Broadway, N. Y

PROPOSALS.

CITY-HALL. [At Richmond, Va.]

CITY ENGINEER'S OFFICE, RICHMOND, VA., October 15, 1884.

Sealed proposals are invited **until December 1st, at 12 o'clock, M.,** for building a new city-hall at Richmond, Va.

Drawings, specifications, and printed forms can be seen at this office.

The Committee on Grounds and Buildings reserves the right to reject any and all bids.

For further information apply to the undersigned.

466 W. E. CUTSHAW, City Engineer.

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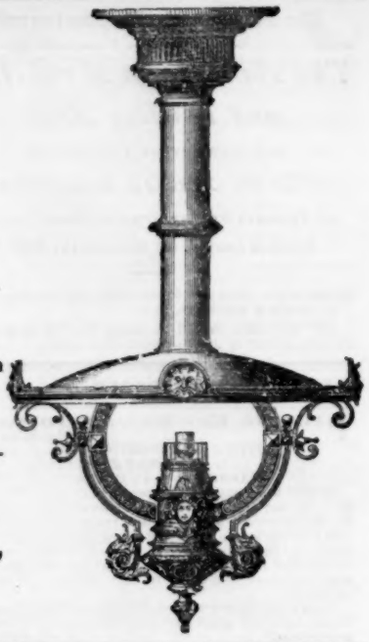

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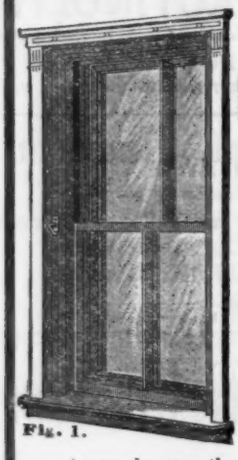

Fig. 1.

Fig. 1.—Interior view of window, with ATTWELL LOCK applied, the key-head and escutcheon being alone visible.

Fig. 2.

Fig. 2.—Sectional view of frame at left of meeting-rails of sash, showing Locks A A mortised into frame on right and left of parting-bead. B, the Escutcheon, located over keyhole in reveal of frame. C, the REMOVABLE Key, controlling from the ONE POINT THE TWO LOCKS A A. D D, the Bolts of Locks, one controlling each sash, operated separately, but working in combination. L, a lug on key, used in operating "shut off"—*i. e.*, holding, at pleasure, either bolt out of engagement with "strike."

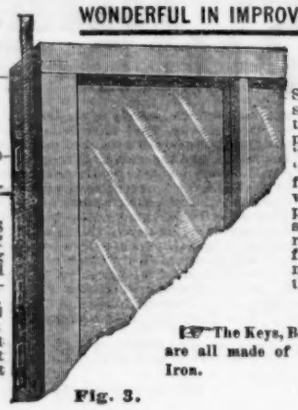

Fig. 3.

Fig. 3.—Section of sash showing location and application of "strike." This "strike" gives four locking or ventilating points to each sash within a radius of safety from the admission of the thief's body.

☞ **The Keys, Bolts and Strikes are all made of best Malleable Iron.**

As may be seen, these Locks are so located and constructed that *the thief cannot control or force them*, and are especially *convenient to the user*. You can *ventilate*, and, by *removing key*, lock with *safety* at same time. The sashes are *automatically locked*, dispensing with all *care and labor* of closing, and avoiding the possibility of an *omission to lock*. An **ideal sash lock** *to every window, and, where weights are not used*, lends all needed power for *holding and controlling either sash, or both, for purposes of ventilation!* They are *simple in construction, easily applied, adapted to all windows, thoroughly practical in mechanical detail, and are truly possessed of every attribute and novel power claimed for them.*

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PROPOSALS.

COURT-HOUSE FRONT.
[At Woodstock, Va.]

Sealed proposals will be received at the office of the Clerk of the County Court of Shenandoah County, **until Monday, November 24, 1884, 10 o'clock,** A. M., for furnishing the materials and performing the necessary labor for the erection of a court-house front at Woodstock, Va.

The building to be of brick, with stone facing, 40′ x 75′, two-st'y, with mansard roof and tower, with the clerk's offices (Circuit and County) on the lower floor fire-proof.

Plans and specifications may be seen at the County Clerk's Office, or at the office of T. F. Schneider, Architect, 933 F St., n w Washington, D. C.

Each bid must state the time required for the completion of the building, and a proper bond will also be required of the person who is awarded the contract.

The Board of Supervisors reserve the right to reject any and all bids.

By order of the Board. L. S. WALKER,
464 Clerk Board Supervisors Shen. Co. Va.

HEADSTONES.
[At Washington, D. C.]

OFFICE OF NATIONAL CEMETERY,
WASHINGTON, D. C., September 27, 1884.

Sealed proposals, in triplicate, with a copy of this advertisement attached to each, will be received at this office **until 12** M., **Thursday, November 6, 1884,** for furnishing 4,000 headstones, more or less, of American white marble, for unmarked graves of Union soldiers, under the provisions of the Acts of Congress of March 3, 1873, and February 3, 1879.

PROPOSALS.

Specifications for the work, blank forms of proposals, and all necessary information on the subject will be furnished on application to this office.

Proposals are required to be submitted on the forms supplied for the purpose.

The right is reserved to reject any or all bids.

Bids should be indorsed, "Proposals for Furnishing Headstones," and addressed to the undersigned.

R. N. BATCHELDER,
462 Deputy Quartermaster Gen., U. S. A.

ARMY BUILDINGS.
[At Camp Rice, Tex.]

HEADQUARTERS DEPARTMENT OF TEXAS,
OFFICE OF CHIEF QUARTERMASTER,
SAN ANTONIO, TEX., October 11, 1884.

Sealed proposals in triplicate, subject to usual conditions, will be received at this office **until 12 o'clock, noon, on the 11th day of November, 1884,** at which time and place they will be opened in presence of bidders, for the construction at Camp Rice, Tex., of 17 brick buildings, according to plans and specifications on file in this office, which will be furnished on application, together with blank proposals, and circulars giving full instructions as to manner of bidding and terms of contract.

The Government reserves the right to reject any or all proposals.

Envelopes containing proposals should be marked "Proposals for Construction at Camp Rice, Tex.," and addressed to the undersigned. J. G. C. LEE,
462 Major and Chief Quartermaster.

PROPOSALS.

BREAKWATER.
[Delaware Bay.]

U. S. ENGINEER OFFICE, 1125 GIRARD STREET,
PHILADELPHIA, PA., October 16, 1884.

Sealed proposals, in triplicate, will be received at this office **until 12 o'clock,** M., **of Saturday, November 15, 1884,** and opened immediately thereafter, for 23,000 tons of stone, more or less, to be used in the construction of the Delaware Breakwater Harbor.

For blank forms, specifications, etc., apply at this office. W. H. HEUER,
463 Major of Engineers, U. S. Army

JOINERS WORK AND WOOD FLOORING.
[At Jackson, Miss.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., October 21, 1884.

Sealed proposals will be received at this office until 2 P. M., **on the 11th day of November, 1884,** for furnishing and fixing in place all the joiner work and wood flooring required for the court-house and post-office building at Jackson, Miss., in accordance with drawings and specification, copies of which may be seen and any additional information obtained on application at this office, or the office of the superintendent.

Bids must be accompanied by a certified check, and those received after the time of opening will not be considered. M. E. BELL,
462 Supervising Architect.

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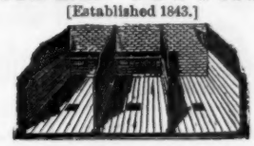

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[Advertisers can be indexed only under a single head free of charge.]

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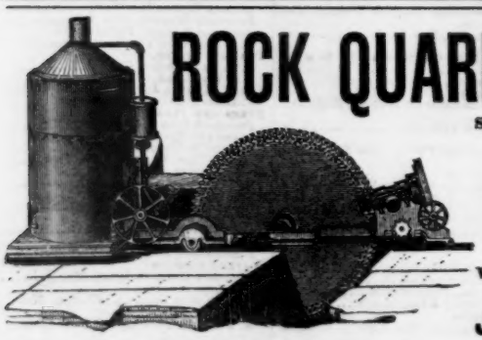

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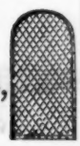

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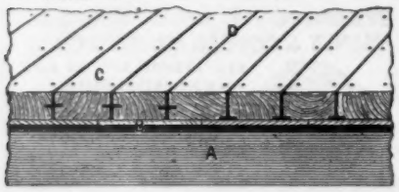

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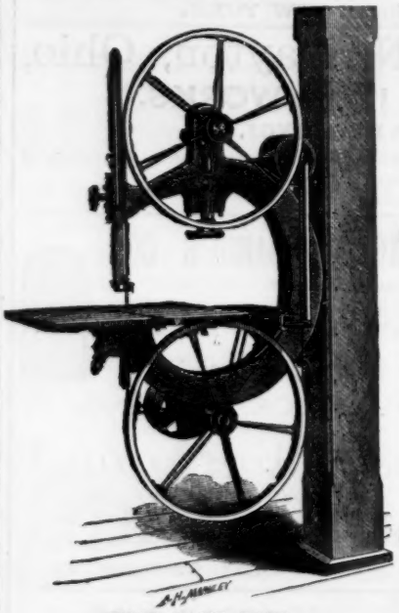

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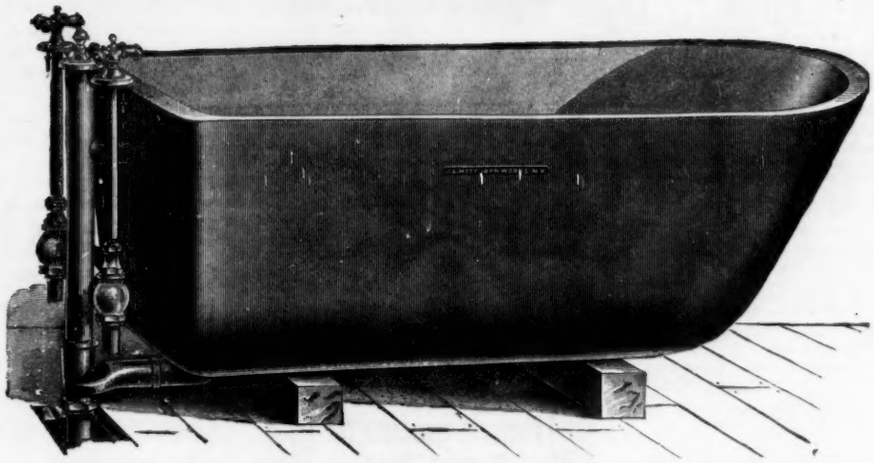

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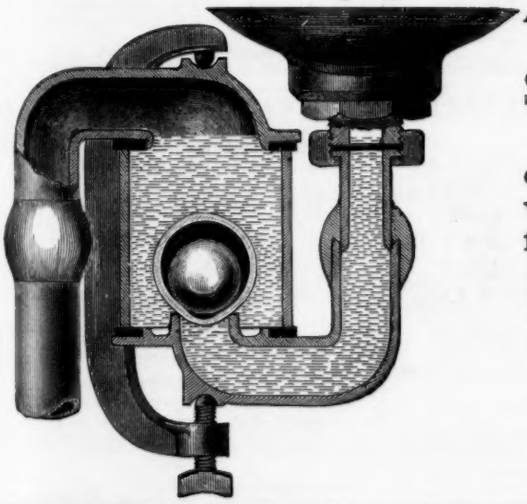

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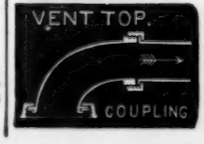

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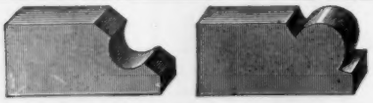

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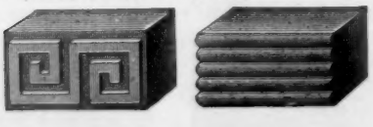

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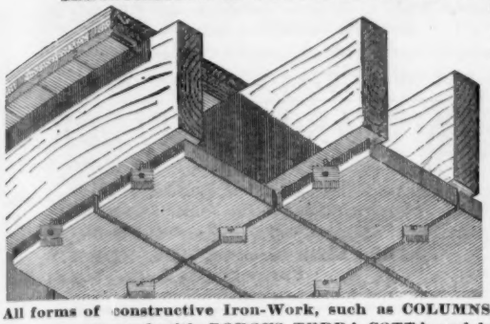

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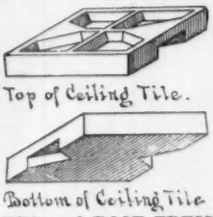

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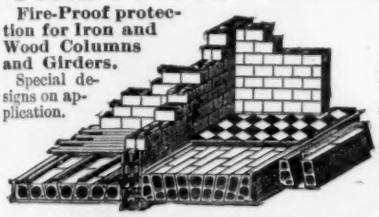

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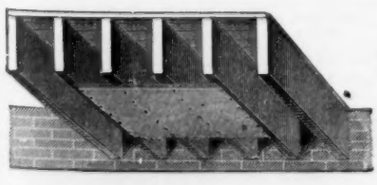

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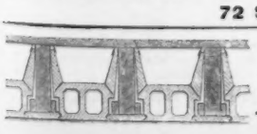

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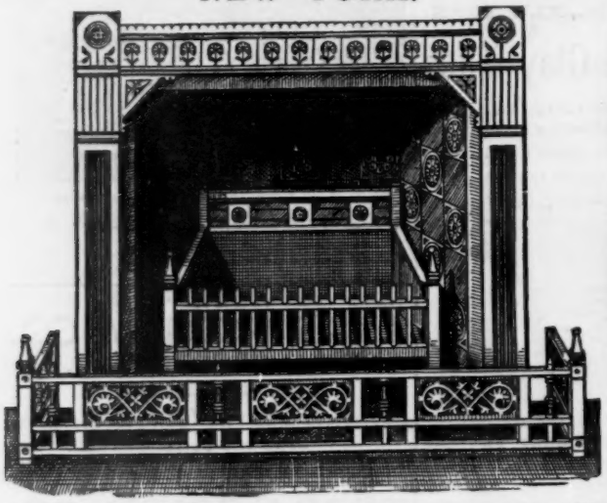

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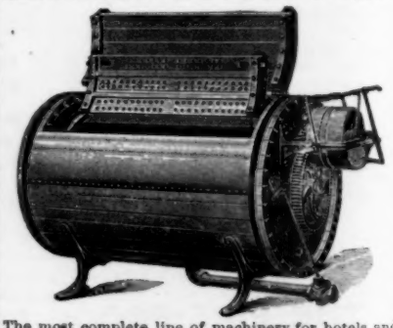

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